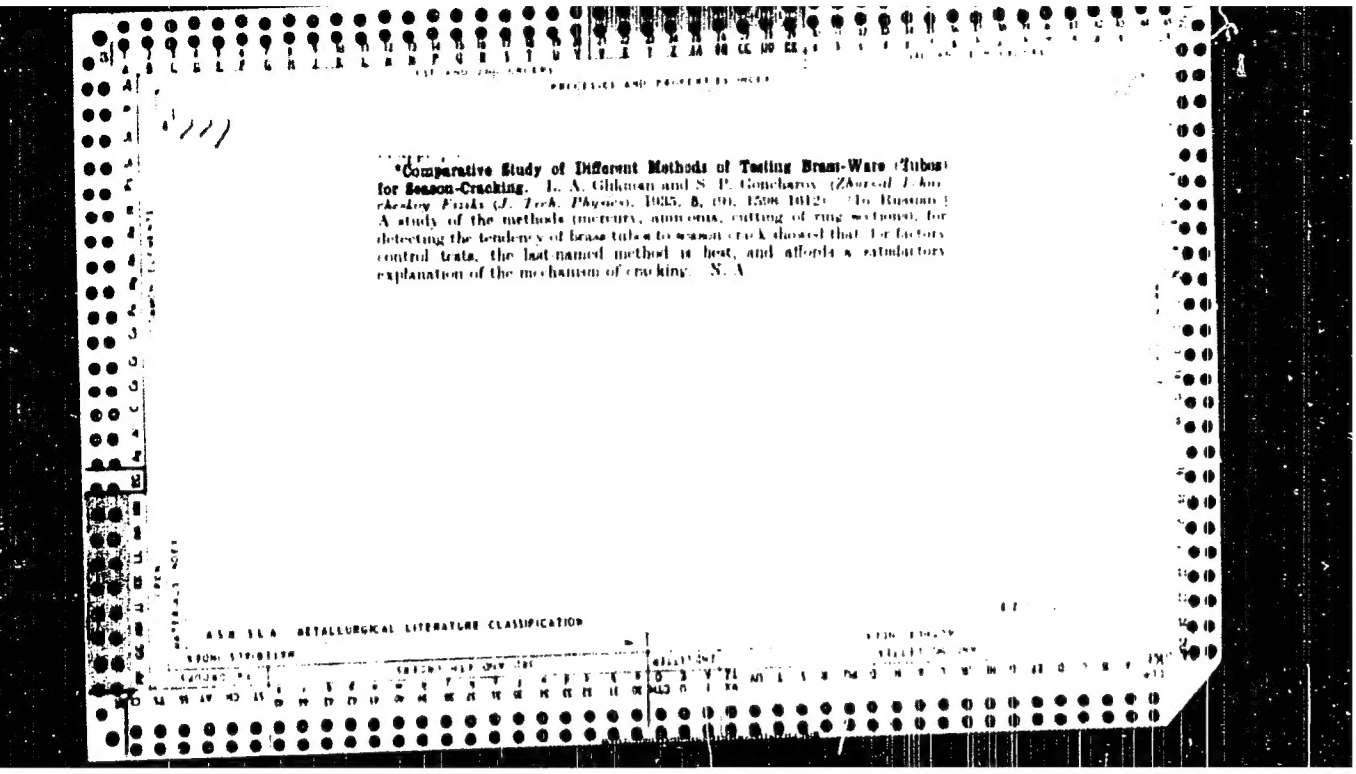
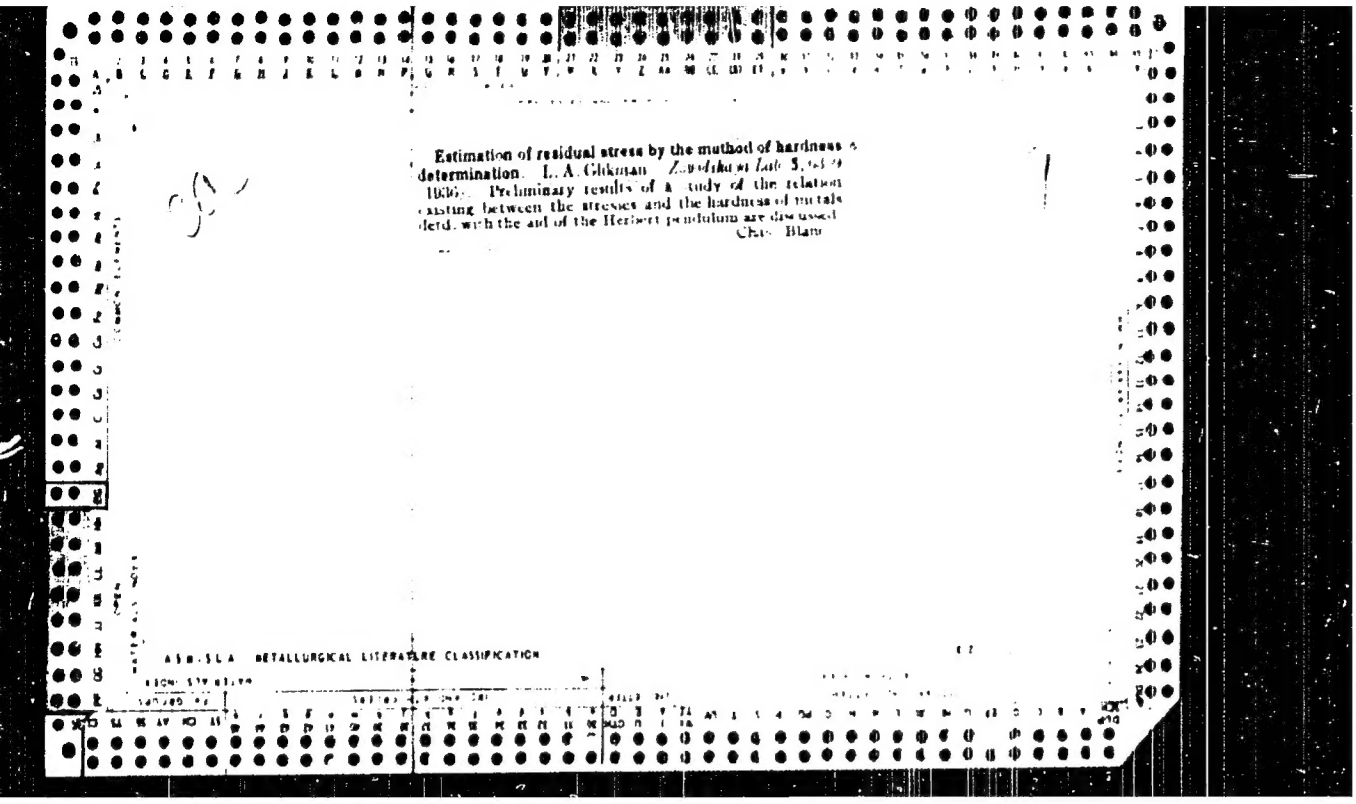


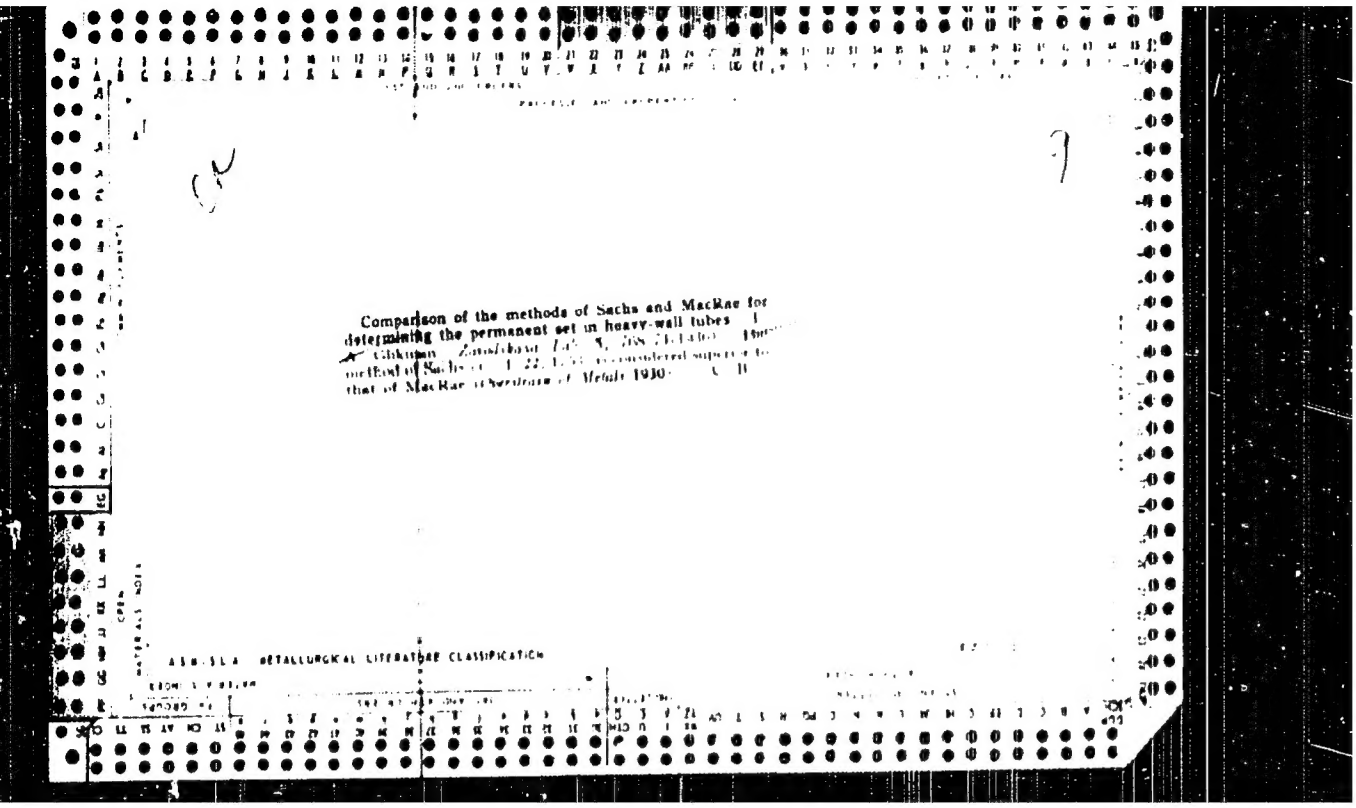
***Comparative Study of Different Methods of Testing Brass-Ware (Tubes) for Season-Cracking.** L. A. Glikman and S. P. Goncharov. (*Zhurnal Tekhnicheskoy Fiziki* (*J. Tech. Physics*), 1935, 5, (9), 1508-1512.) (In Russian.) A study of the methods (mercury, ammonia, cutting of ring sections), for detecting the tendency of brass tubes to season crack showed that for factory control tests, the last-named method is best, and affords a satisfactory explanation of the mechanism of cracking. S. A.

ASM 31.4 METALLURGICAL LITERATURE CLASSIFICATION



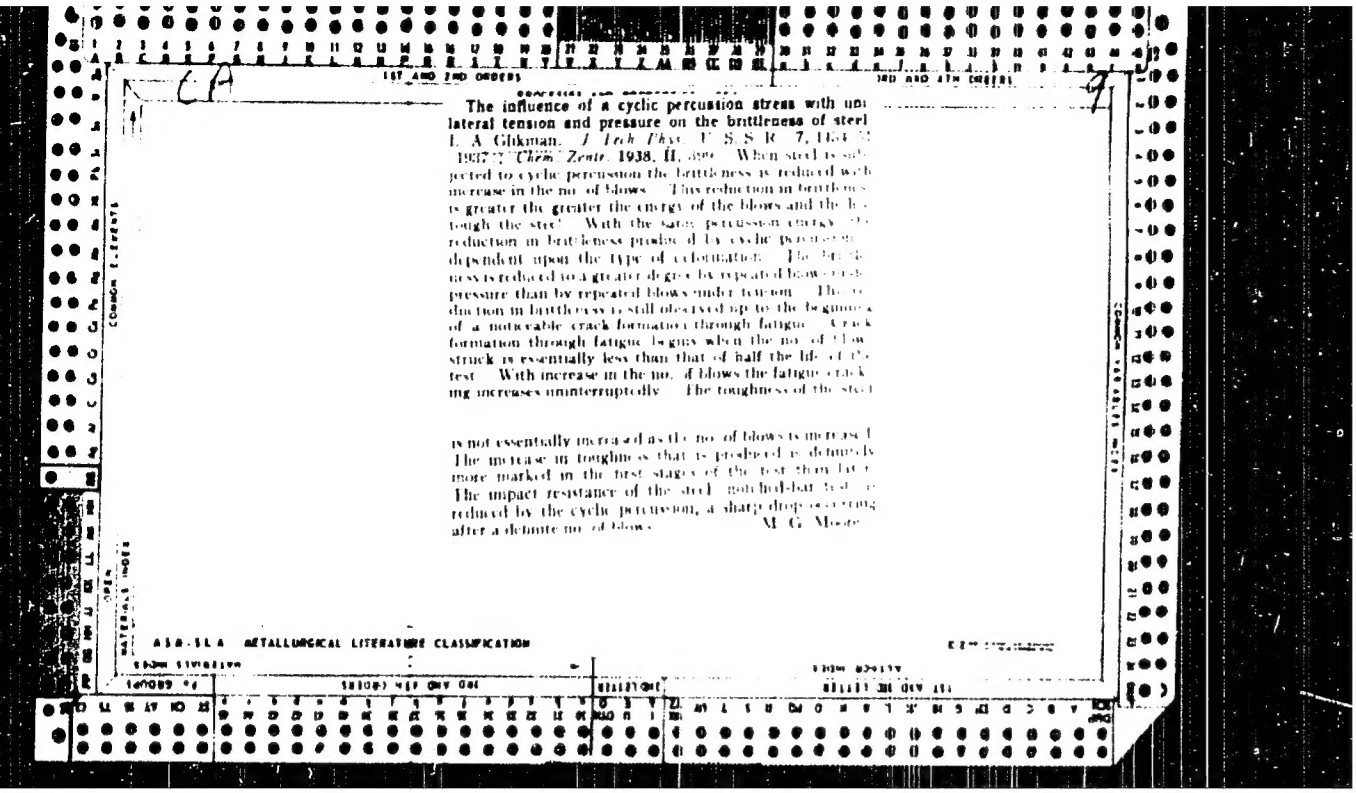
Estimation of residual stress by the method of hardness determination. L. A. Glikman. *Zavodskaya Lab.* 5, 1936. Preliminary results of a study of the relation existing between the stresses and the hardness of metals determined with the aid of the Herbert pendulum are discussed. Chas. Blatz

A.S.M.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION



Comparison of the methods of Sachs and MacRae for determining the permanent set in heavy-wall tubes

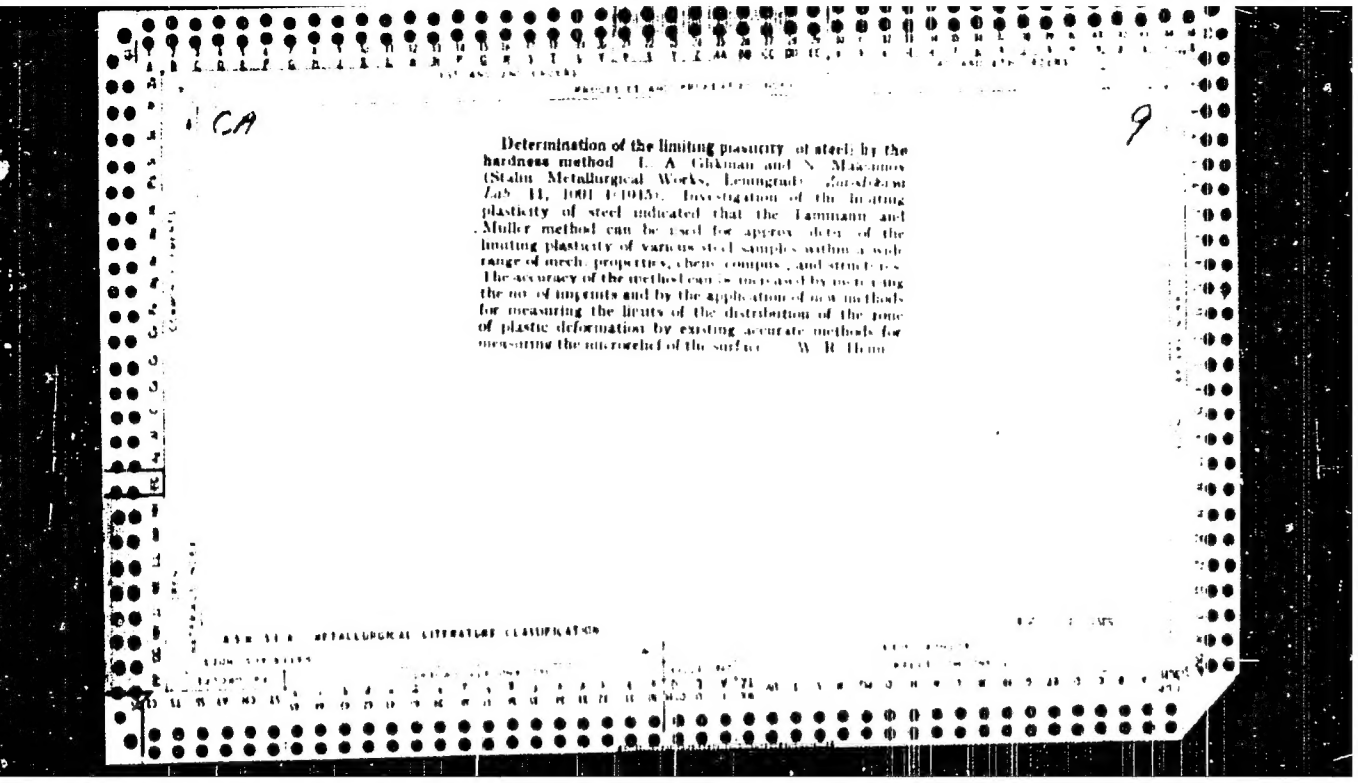
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



The influence of a cyclic percussion stress with uni
lateral tension and pressure on the brittleness of steel

L. A. Glikman. *J. Tech. Phys. U.S.S.R.* 7, 1[illegible] 1937; *Chem. Zentr.* 1938, II, 3[illegible]. When steel is subjected to cyclic percussion the brittleness is reduced with increase in the no. of blows. This reduction in brittleness is greater the greater the energy of the blows and the less tough the steel. With the same percussion energy the reduction in brittleness produced by cyclic percussion is dependent upon the type of deformation. The brittleness is reduced to a greater degree by repeated blows under pressure than by repeated blows under tension. The reduction in brittleness is still observed up to the beginning of a noticeable crack formation through fatigue. Crack formation through fatigue begins when the no. of blows struck is essentially less than that of half the life of the test. With increase in the no. of blows the fatigue cracking increases uninterruptedly. The toughness of the steel is not essentially increased as the no. of blows is increased. The increase in toughness that is produced is definitely more marked in the first stages of the test than later. The impact resistance of the steel notched-bar test is reduced by the cyclic percussion, a sharp drop occurring after a definite no. of blows.

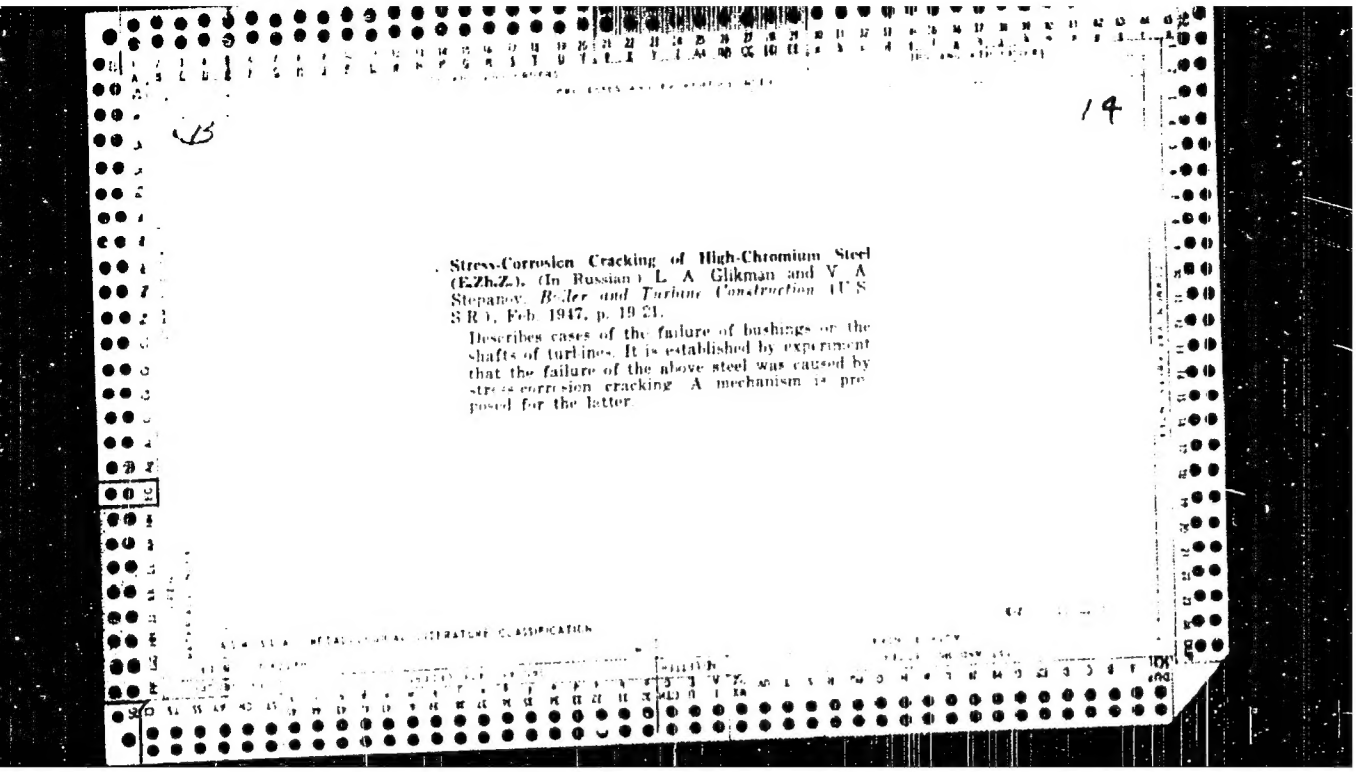
M. G. Moore



1 CA 9

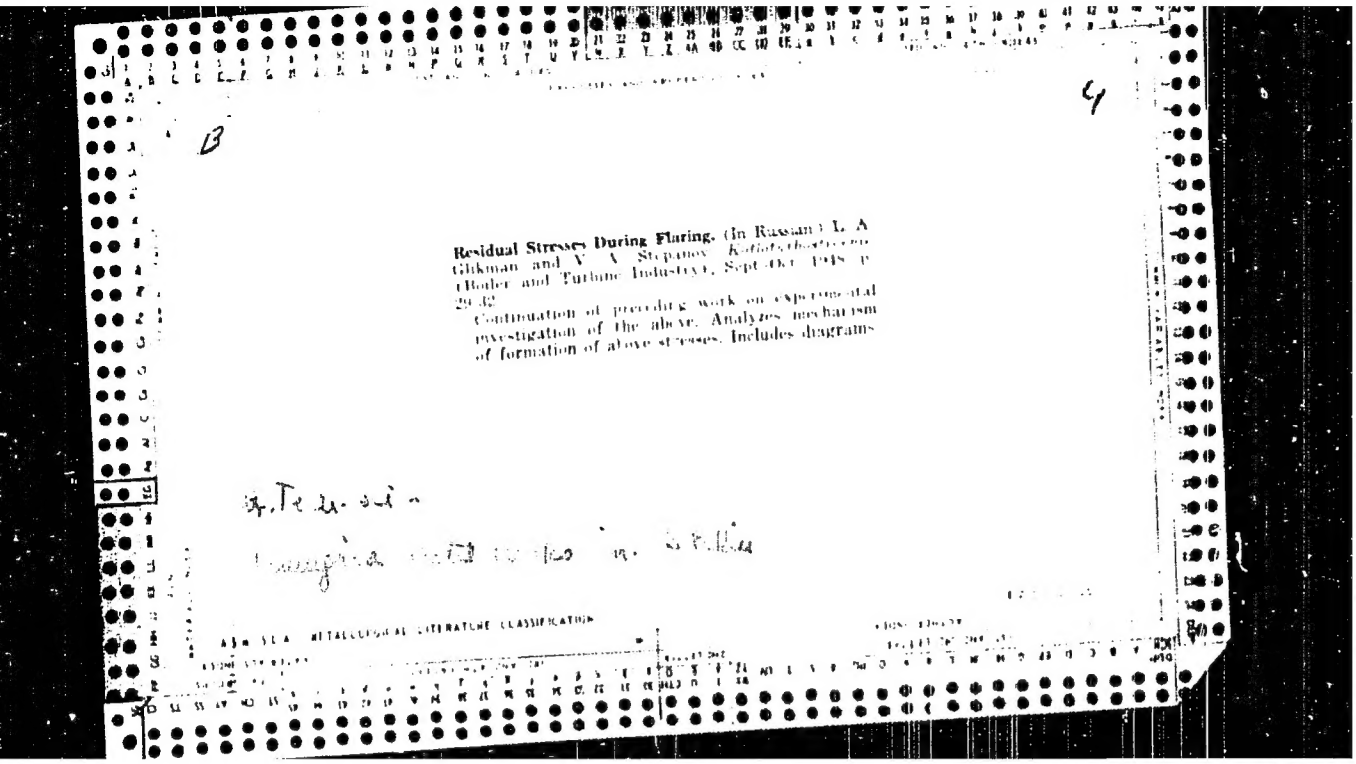
Determination of the limiting plasticity of steel by the hardness method I. A. Glikman and N. Maximov (Stalin Metallurgical Works, Leningrad). *Zavodskaya Lab.* 11, 1001-4(1945). Investigation of the limiting plasticity of steel indicated that the Tammann and Muller method can be used for approx. detn. of the limiting plasticity of various steel samples within a wide range of mech. properties, chem. compns., and structures. The accuracy of the method can be increased by increasing the no. of impacts and by the application of new methods for measuring the limits of the distribution of the zone of plastic deformation by existing accurate methods for measuring the microrelief of the surface. W. R. Hess

ASM STEEL METALLURGICAL LITERATURE CLASSIFICATION



Stress-Corrosion Cracking of High-Chromium Steel (EZh2). (In Russian.) L. A. Glikman and V. A. Stepanov. *Boiler and Turbine Construction* (USSR), Feb. 1947, p. 19-21.

Describes cases of the failure of bushings on the shafts of turbines. It is established by experiment that the failure of the above steel was caused by stress-corrosion cracking. A mechanism is proposed for the latter.



Residual Stresses During Flaring. (In Russian.) L. A. Glikman and V. A. Stepanov. Kotloturbostroenie (Boiler and Turbine Industry), Sept.-Oct. 1948, p. 29-32.

Continuation of preceding work on experimental investigation of the above. Analyzes mechanism of formation of above stresses. Includes diagrams.

USSR/Engineering - Steel, Rolled Oct 49
Strength of Materials

"Isotropy of Rolled Steel in Relation to the Tendency Toward Brittleness," L. A. Glikman, Ye. M. Shevandin, 10 3/4 pp

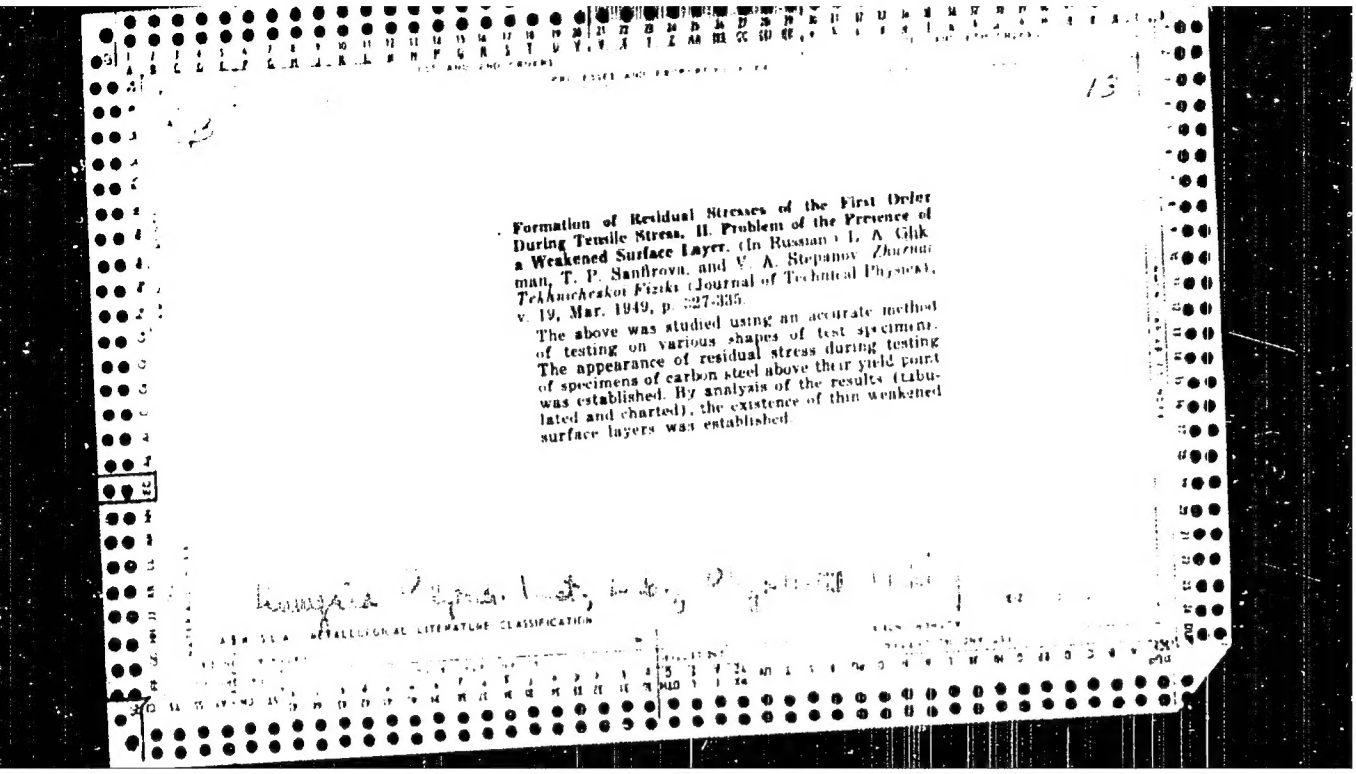
"Zavod Lab" Vol XV, No 10, pp 1218-23

Cold brittleness found to be practically identical for longitudinal and cross-sectional specimens of two steels for three conditions of heat treatment and three types of notches, regardless of impact strength. Additional tests conducted with six more steels. Observed deviation, however, when interrybullization occurred, causing longitudinal specimens to be less brittle than cross-sectional ones.

152T22

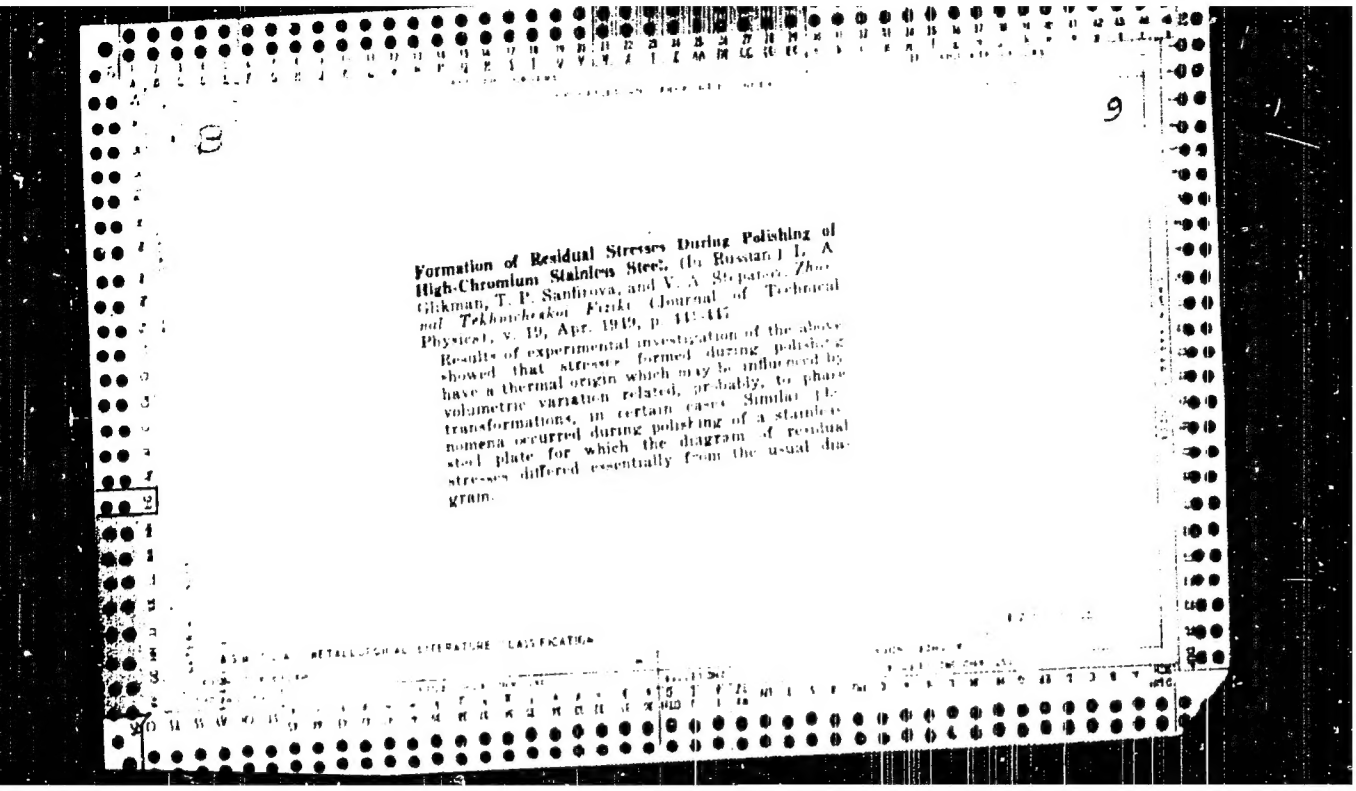
GLIKMAN, L. A.

152T22



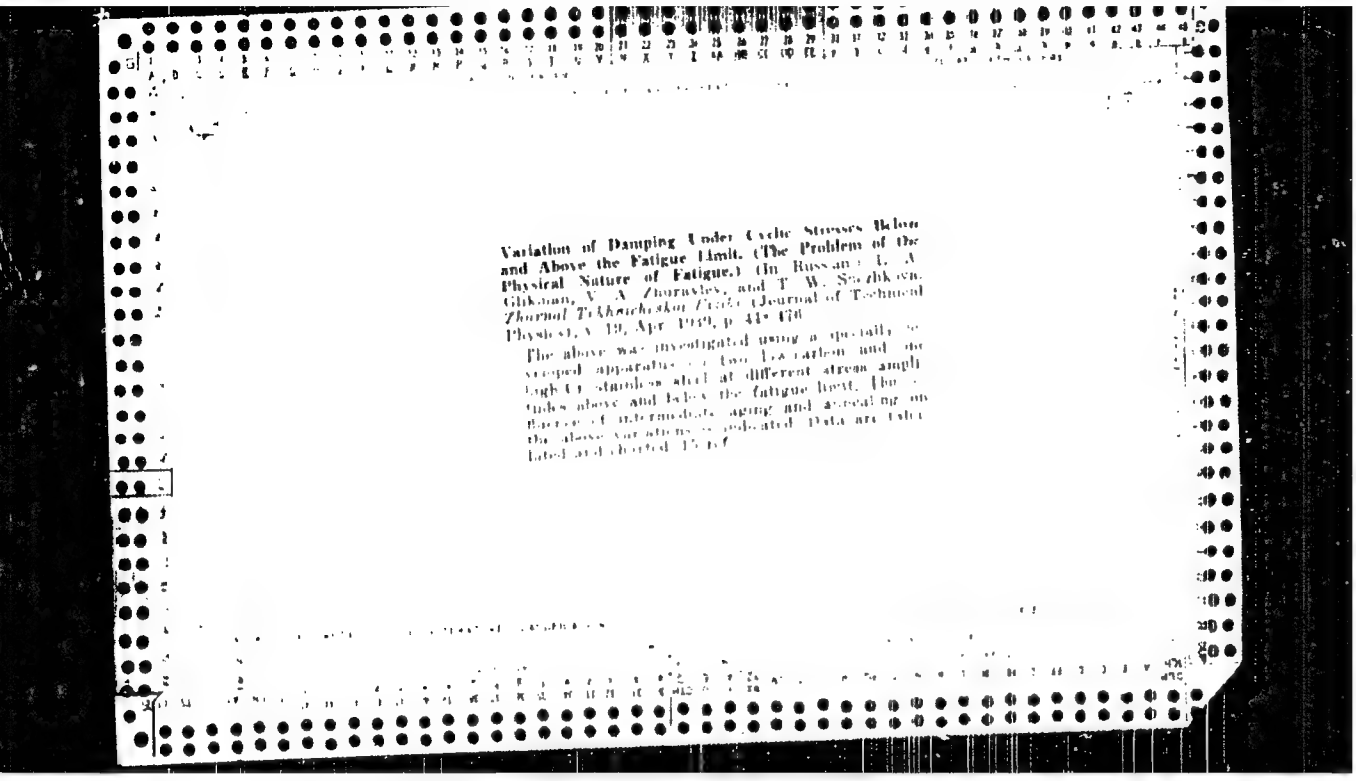
Formation of Residual Stresses of the First Order During Tensile Stress. II. Problem of the Presence of a Weakened Surface Layer. (In Russian.) L. A. Glikman, T. P. Sanfirova, and V. A. Stepanov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 19, Mar. 1949, p. 327-335.

The above was studied using an accurate method of testing on various shapes of test specimens. The appearance of residual stress during testing of specimens of carbon steel above their yield point was established. By analysis of the results (tabulated and charted), the existence of thin weakened surface layers was established.



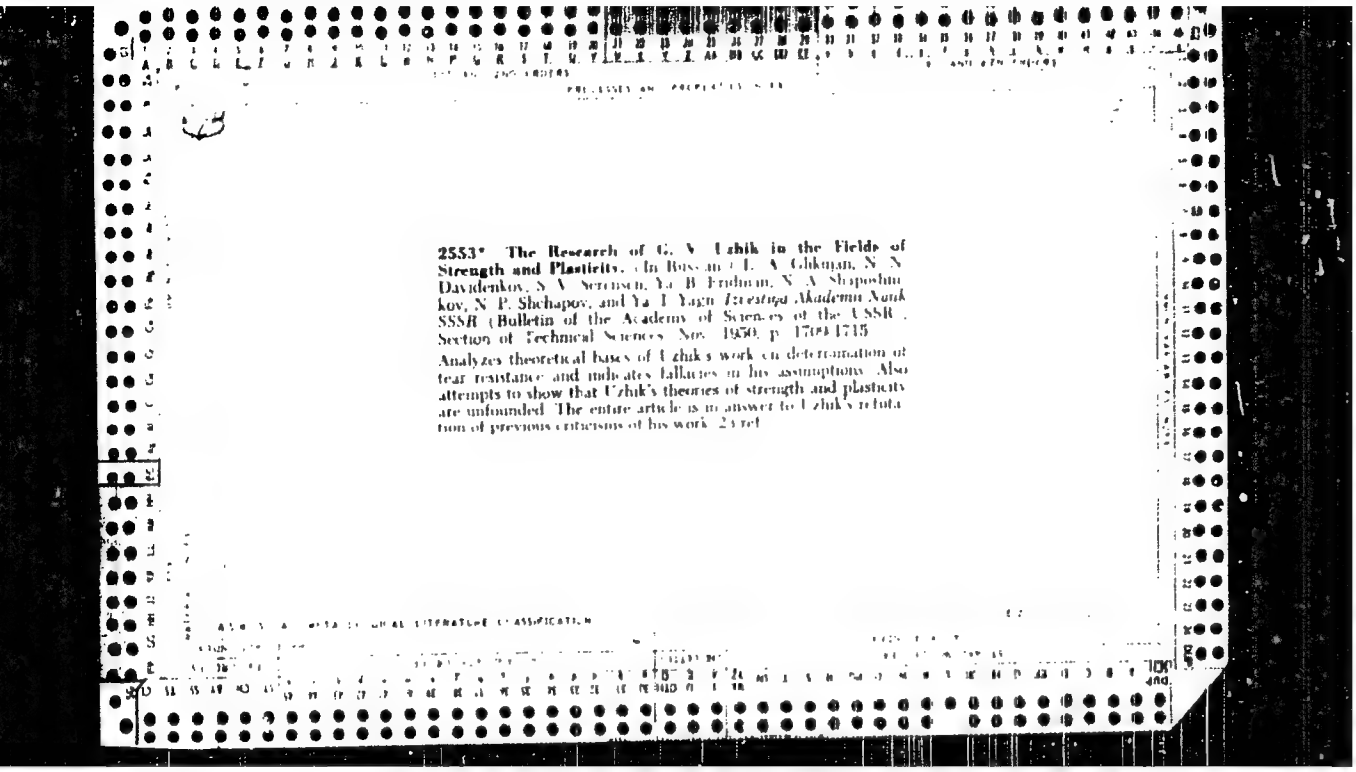
Formation of Residual Stresses During Polishing of High-Chromium Stainless Steel. (In Russian.) I. A. Glikman, T. P. Sanfirova, and V. A. Stepanov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 19, Apr. 1949, p. 441-445

Results of experimental investigation of the above showed that stresses formed during polishing have a thermal origin which may be influenced by volumetric variation related, probably, to phase transformations, in certain cases. Similar phenomena occurred during polishing of a stainless steel plate for which the diagram of residual stresses differed essentially from the usual diagram.



Variation of Damping Under Cyclic Stresses Below and Above the Fatigue Limit. (The Problem of the Physical Nature of Fatigue.) (In Russian) L. A. Glikman, V. A. Zhornakov, and T. W. Sozhkova. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 19, Apr. 1949, p. 445-450

The above was investigated using a specially s... stepped apparatus ... two Cr-carbon and ... high Cr stainless steel at different stress ampli... cycles above and below the fatigue limit. The ... Period of intermediate aging and several ... the above variations ... indicated. Data are tabu... tabulated and charted. 5 ref.



2553* **The Research of G. V. Uzhik in the Fields of Strength and Plasticity.** (In Russian.) L. A. Glikman, N. N. Davidenkov, S. V. Serensen, Ya. B. Fridman, N. A. Shaposhnikov, N. P. Shchapov, and Ya. I. Yagn. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Nov. 1950, p. 1709-1715.

Analyzes theoretical bases of Uzhik's work on determination of tear resistance and indicates fallacies in his assumptions. Also attempts to show that Uzhik's theories of strength and plasticity are unfounded. The entire article is an answer to Uzhik's refutation of previous criticisms of his work. 2 refs.

GLIKMAN, L. A.

USSR/Metals - Stress May 52

"Effect of Cold Working on Fatigue Limit of Steel," L. A. Glikman, N. N. Davidenkov

"Zhur Tekh Fiz" Vol XXI, No 5, pp 573-577

Examd effect of compressive plastic deformation on fatigue limit of EZh-1 steel with high chromium content. According to theory of orientative effect of micro-defects, one should have expected drop of fatigue limit. Instead found a rise reaching 13.5%. Submitted 1 Oct 50.

LC 182T100

GUSEL'SHCHIKOV, M.K., professor; GLIKMAN, L.A., redaktor; Flaum, M.Ya., tekhnicheskiy redaktor.

[Effect of mechanical and thermal factors on the strength of marine boilers] Vliianie mekhanicheskikh i termicheskikh vozdeistvii na prochnost' sudovykh kotlov. Moskva, Izd-vo "Morskoi transport," 1952. 55 p. [Microfilm] (MLRA 7:10)

(Steam boilers, Marine)

GLIKMAN, L. A.

USSR/Metals - Anomalous Extinguishment Feb 52

"Anomalous Variation of Extinguishment of Steels With Low Carbon Content During Rising Temperature," L. A. Glikman, Z. V. Shishokina

"Zhur Tekh Fiz" Vol XXII, No 2, pp 300-307

Attempts to clarify phys nature of specified problem. Phenomenon is particularly conspicuous in temp range 50-150°C with a max at 100°C. It is assumed that anomalous variation of decrement is connected to diffusion processes of Ni-atoms, dissolved in alpha-iron. Indebted to N. N. Davidenkov. Received 31 Jul 51.

209187

1. GLIKMAN, L. A., TEKHT, V. P.

2. SSSR (600)

4. Metals-Fatigue

7. Physical nature of the fatigue process.
Dokl. AN SSSR 86 No. 4, 1952

Carbon steel 35 and stainless steel Zh-2 were investigated by method of V. I. Iveronova and T. P. Kostetskaya (see Zhur. Tekh. Fiz. 10, 4, 1940) using radiograms due to cobalt and chromium rays, which produced interference pattern on film and showed distortion of atomic lattice at deformation. Fatigue is a process similar to that occurring at deformation and is due to "weakened" grains. Presented by Acad I. P. Bardin 5 Aug 52.

252T44

9. Monthly List of Russian Accessions, Library of Congress, February 1953. Unclassified.

USSR

Effect of chromium plating on the damping decrement. L. A. Glikman, M. M. Piyavskii, and T. N. Snezhkova. Zhur. Tekh. Fiz. 23, 464-78(1953).—A bright layer (0.1 mm.) of Cr on steel increased the abs. value of the logarithmic decrement by 0.4-0.6%. The abs. increase of decrement was independent of the amplitude of the voltage. Decrease in the thickness of the Cr layer decreased the damping increment. At 500°, the damping of Cr-plated samples was practically the same as for unplated samples. The steels studied were: 30KhMA (C 0.33, Cr 1.1, Mo 0.23%); 21N5A (C 0.2, Si 0.3, Mn 0.37, Cr 0.13, Ni 4.6%); Zh-1 (C 0.14, Cr 12.32%); Zh-2 (C 0.21, Cr 13.35%); EI126 (austenitic) (C 0.4, Si 0.85, Mn 0.5, Cr 13.89, Ni 36.85, W 2.4%). The damping decrement was recorded photoelectrically.

A. P. Kotloby

GLIKMAN L., doktor tekhnicheskikh nauk; ZOBACHEV, Yu.

Ways of increasing the life of ship propellers. Mor.i rech.flot 14 no.4:20-22 Ap '54. (MLRA 7:5)
(Propellers)

FD 361

USSR/Physics - Oscillations in Metals

Card 1/1

Author : Glikman, L. A. and Kheyn, Ye. A.

Title : Effect of cold hardening and aging on attenuation of oscillations of low-carbon steel

Periodical : Zhur. tekh. fiz. 24, 400-411, Mar 1954

Abstract : Effect of cold hardening on variation of attenuation, related to amplitudes of stresses was investigated by stretching specimens to elongation of 2 to 12.5% and subsequent heating within 100-650° C. The obtained results confirm assumptions that attenuation is affected by two types of processes: diffusional and local plastic deformation.

Institution :

Submitted : October 14, 1953

USSR/Physics - Oscillations in Metals

Card 1/1

Author : Glikman, L. A., Kheyn, Ye. A.

Title : Effect of cold working and aging on attenuation of oscillations of copper. II

Periodical : Zhur. tekh. fiz. 24, 560-565, Mar 1954

Abstract : Studies attenuation of copper in the range of stress amplitudes from 0.05 to 1 kg/sq mm. Effect of cold hardening by tension was investigated on round specimens at degrees of plastic elongation from 1.5 to 28% with subsequent heating in the 100-400° C range. Concludes that in general effect of cold hardening and aging on attenuation of copper is similar to the effect of the same factors on attenuation of low-carbon steel, except changes in attenuation at stress amplitudes close to zero. Diagrams.

Institution :

Submitted : October 14, 1953

GLIKMAN, L.A., doktor tekhnicheskikh nauk; ZOBACHEV, Yu.Ye., inzhener.

Ways to increase the life of a ship's propeller shaft.
Trudy TSNIIMF no.28:3-44 '54. (MLRA 9:1)

(Shafts and shafting) (Corrosion and anticorrosives)

GLIKMAN, L.A., doktor tekhnicheskikh nauk; TEKHT, V.P., kandidat tekhnicheskikh nauk; ZOBACHEV, Yu.Ye., inzhener.

Problem of the physical nature of cavitation breakdowns. Trudy TSNIIRF no.28:45-59 '54.

(Cavitation) (Matallography)

GLIKMAN, L.A.; BOGORAD, L.Ya.; SUPRUN, L.A.; GAKMAN, E.L.; ZHUKOVA, V.I., inzh.; red.; FREGER, A., tekhn.red.

[The effect of chrome plating on fatigue and corrosion resistance of steel] Vliianie khromirovaniia na ustalostnuiu i korrozionno-ustalostnuiu prachnost' stali. Leningrad, 1955. 9 p. (Leningradskii dom nauchno-tekhnicheskoi propagandy. Informatsionno-tekhnicheskii listok, no.84(772)) (MIRA 10:12)

(Chromium plating)

GLIKMAN, L.A.; DAVIDENKOV, N.N., retsenzent; SKORCHELLETTI, V.V., kandidat tekhnicheskikh nauk, redaktor; POL'SKAYA, R.G., tekhnicheskiy redaktor

[Mechanical strength and corrosion resistance of metals] Korrozionno-mekhanicheskaia prochnost' metallov. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1955. 174 p. [Microfilm] (MLRA 8:2)

1. Deystvitel'nyy chlen AN USSR (for Davidenkov).
(Strength of materials) (Corrosion and anticorrosives)

GLIKMAN, L.A., doktor tekhnicheskikh nauk, professor; SUPRUN, L.A., inzhener.

Effect of cathode polarization with protectors and external currents on an increase of fatigue strength under corrosion. Metalloved.i obr.met. no.6:10-15 D '55. (MLRA 9:3)

1. TSentral'nyy nauchno-issledovatel'skiy institut morskogo flota.
(Corrosion and anticorrosives) (Metals--Testing)

USSR/Physics - Cavitation

Card 1/

Pub. 153 - 14/23

Author : Glikman, L. A.; Teicht, V P.; Zobachev, Yu. Ye

Title : Problem of the physical nature of cavitational destruction

Periodical : Zhur tekh. fiz , 29, February 1959, 260-2

Abstract : The authors state that although there are many ... (e.g. I. M. Beteer, Usp fiz nauk, 3, No 2, 1923; I. M. Vasilenko, Kavitatsiya i eroziya sudovykh grebnykh vintov [Cavitation and erosion of ship screw propellers], Ship Industry Press, 1944; M. O. Kornfel'd, Uprugost' i prochnost' zhidkostey [Elasticity and stability of fluids], GITTL, 1951; V. A. Konstantinov, Dokl. AN SSSR, 4, No 3, 1947) there are no generally accepted ideas as to the physical nature of cavitational destruction and as to the mechanism governing the occurrence of this process. They present new experimental data in an investigation of the surface layer of specimens subjected to cavitational action in a magnetostriction vibrator in initial or earlier stages of destruction. [illegible] analysis and [illegible]

Abstract : namely on various steels, brass, and nonferrous alloys. They claim that their results permit sharpening existing concepts of cavitational destruction; they present photographs and detailed conclusions (e.g. establishment of plastic deformation in the surface layer etc.). Nine references: e.g. I. A. Gliman, Izvid., 7, 14, 1434, 1957.

Institution : -

Submitted : May 16, 1958

Translation from: Referativnyy zhurnal, Met[illegible] [illegible] SSSR

AUTHORS: Glikman, L. A., Zobachev, Yu. Ye.

TITLE: The Effect of Cathodic Polarization [illegible] an External Current and on My Protective [illegible] Stability of Carbon Steel in Tests Performed on a Magnetostrictive [illegible] the Problem of the Physical Nature of Cavitation [illegible]) [Vliyaniye katodnoy polyarizatsii [illegible] magnitnym protektorom na kavitatsionnuyu [illegible] stali pri ispytanii na magnitostriktsionnom vibratore [illegible] o fizicheskoy prirode kavitatsionnogo razrusheniya metallov]

PERIODICAL: Tr. Tsentr. n-i [illegible] morsk. flota, 1957, No. [illegible] pp. [illegible]

ABSTRACT: The testing of annealed carbon steel [illegible] per cent C was carried out in a magnetostriction vibrator, in which the specimen was caused to vibrate with an amplitude of 76 μ at a frequency of 8000 cps, in sea water (Black Sea composition) and also for the sake of comparison in tap water. The loss in weight was taken as the criterion of cavitational stability. During cathodic polarization (P) the current density was kept [illegible] between 0.6 and 4.2 [illegible] In addition, tests were also carried

Card 1/3

The Effect of Cathodic Polarization, Accomplished by Means of [illegible]

out under conditions of anodic [illegible] graphite served as the material for the anode. It was established that, with increased density of the cathodic current, the rate of cathodic breakdown (CB) is considerably lowered, but that at maximum current densities the weight loss in sea water is very significant and that it comprises approx. 70 percent of the weight lost in fresh water during CB. The large extent of CB, approaching the value for corrosion resistant materials with approximately identical mechanical properties, points to the great importance of the mechanical aspect. Results obtained also reveal the relatively high corrosion losses during CB, which can also be explained by the mechanical aspect. The mechanism of this process consists in the appearance of cyclic plastic deformation (PD) in individual microvolumes, which is a result of the mechanical action of recurrent single impacts. The PD results in a considerable electrochemical non-homogeneity, the primary condition for which is the simultaneousness of the PD process and the action of the medium. The electrochemical non-uniformity is also intensified by microscopic regions of a PD which does not occur simultaneously throughout the area subjected to cavitation. It is shown that the employment of Mg protectors restores the fatigue strength of specimens cath-

Card 2/3

1. Steel-Cavitation-Test results 2. Polarization-Applications
3. Magnetostriction-Applications 4. Vibrating mechanisms-
Applications

The Effect of Cathodic Polarization, Accomplished by Means of (cont.)

subjected to simultaneous corrosive action of salt water to 90 percent of its value in air. The fact that Mg protectors have no effect upon CB is an indication that electrochemical non-homogeneity is considerably greater in CB than it is in a fatigue process. At greater current densities the anodic P process resulted in a significant acceleration of the CB owing to the anodic dissolution of specimens being tested.

Card 3/3

Translation from: Referativnyy zhurnal, Metallurgiya, [illegible] (USSR)

AUTHORS: Glikman, L. A., Babayev, A. N.

TITLE: Effective Application of the Zak- Method of Determining Re[illegible] Stresses in Solid and Hollow Cylinder[illegible] (Effektivnoye primeneniye sposoba Zak-a pri opredelenii ostatochnykh napryazheniy v sploshnykh i polykh tsilindrakh)

PERIODICAL: Tr. Tsentr[illegible] n-i in-t chernoy Met., 1960, No. [illegible], pp. [illegible]

ABSTRACT: The application of a modified Zak- method is described [illegible] is employed in determining a complete characteristic diagram of the residual stresses (RS) in a cylinder (disc) by means of successive boring and turning. Also described are the results of a comparison of magnitudes of deformation, measured by means of an optical gage and wire strain gages (SG). The procedure presented for the calculation of the RS, in the case of the successive employment of boring and turning operations, does not introduce any significant additional complications as compared with the usual RS computations according to the Zak- method. It is shown theoretically that preliminary boring results in the removal of in the remaining part of the cylinder of axial RS that are constant

Card 1/3

Rational Employment of the Zaks Method (cont.)

over the cross section and varying tangential and radial [illegible]. Experimental work was performed on discs (D) 105 mm in diameter and 15 mm thick, made of grade 3 steel taken from cylindrical blanks 600 mm long and 110 mm in diameter. RS were induced in the blanks by heating them to a temperature of 650° and keeping them at that temperature for five hours; this was followed by quenching in water in a vertical position. 8 D [illegible] cut from the center portion of the blank and, for purposes of comparison, several of them were investigated by the usual Z [illegible] method by determining deformation from a measurement of the outer diameter by means of a horizontal optimeter. It is shown experimentally that SG's are as accurate as the optical gage and that they simplify considerably the process of measuring deformations and determining RS in large cylinders. It is pointed out that the Zaks method for the determination of a complete RS curve may be employed expeditiously on a single D by successively removing layers of material first by boring and then by turning. In that instance, a complete RS curve is obtained by interpolating the stresses in the internal zone. Application of the modified Zaks method should be particularly considered in the case [illegible] the RS curves in the outer layer of a cylinder (disc) or in both

Card 2/3

Rational Employment of the Zaks Method (cont.)

the outer and inner layers of a solid cylinder, are characterized by a large RS gradient

[illegible]

1. Cylinders-Stresses-Determination

Card 3/3

137-58-1-1316

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 1, p 176 (USSR)

AUTHORS: Glikman, L. A., Suprun, L. A.

TITLE: On the Development and Mechanism of Corrosion Fatigue Damage (K voprosu o razvitii i mekhanizme korrozionnoustalostnogo razrusheniya)

PERIODICAL: Tr. Tsentr. n.-i. in-ta morsk. flota, 1956, Nr 5, pp 25-31

ABSTRACT: The problem of the laws of initiation and development of cracks (C) in fatigue failure (FF) of steel subjected to corrosion testing simultaneous with cyclic testing over definite periods of time was investigated at various stress amplitudes. Specimens of Nr 35 carbon steel, previously heat treated by normalization from 850° and subsequent high-temperature tempering at 650°C, were tested. The corrosion medium was fresh water and 3% NaCl solution. It was found that under conditions of corrosion fatigue damage the duration of cyclic testing to the time of appearance of visible C was considerably less than in the FF of steel under ordinary atmospheric conditions. With a 3% NaCl solution, the incubation period for the initiation of C was about 10% of the total number of cycles required for failure, while

Card 1/2

137-58-1-1316

On the Development and Mechanism of Corrosion Fatigue Damage

with fresh water it was about 40% and in atmospheric air about 70-90% of the total time required for FF. This distinctive characteristic of the development of fatigue C is explained by the large number of C in the zone of identical stresses normally observed in addition to the fracture in cases of corrosion FF. The speed of spreading of C once started into the depth of the material increases with an increase in stress amplitude and with an increase in the total number of cycles and also with increase in the corrosiveness of the medium. It is shown that preliminary "exercising" of the specimens in air by cyclic testing for 10 million cycles at a level approaching the σ_w (stress amplitude 27 kg/mm^2) increases their corrosion fatigue strength by approximately 30%. This confirms the hypothesis that a developing electrochemical inhomogeneity in the preliminary cyclic testing has a considerably smaller effect on the course of the process of corrosion than does the effect of electrochemical inhomogeneity developing when corrosion is present at the same time.

L. U.

1. Steel--Fatigue 2. Steel--Corrosion 3. Steel--Test methods
4. Steel--Test results

Card 2/2

137-58-1-1317

Translation from: Referativnyy zhurnal, Metallurgiya 1958 Nr 1 p 176 (USSR)

AUTHORS: Glikman, L. A., Suprun, L. A.

TITLE: The Effect of Surface Hardening by Shot Blasting on the Corrosion Fatigue Strength of Steel (Vliyaniye poverkhnostnogo uprochneniya drobestruynoy obrabotkoy na korrozionnoustalostnuyu prochnost' stal.)

PERIODICAL Tr. Tsentr. n.-i. in-ta morsk. flota, 1956, Nr 5, pp 32-35

ABSTRACT: An investigation was made into the effect of shot blasting on fatigue strength (FS) and corrosion fatigue strength (CFS) of specimens of Nr 35 steel that had undergone prior heat treatment. It was found that shot blasting conducted by any of the procedures in current practice, fully approved for standard fatigue testing, retains a favorable influence for corrosion strength in a 3% NaCl solution only over a limited range of cycles (about 2×10^6 cycles). Good protective properties have been demonstrated by a combined protection afforded by shot blasting and by Mg cladding. The CFS proved to be 7% higher than even the FS under atmospheric conditions. From this it follows that to increase the FS of steel products operating under

Card 1/2

137-58-1-1317

The Effect of Surface Hardening (cont.)

the simultaneous effects of variable stresses and corrosion, surface hardening must be applied only in combination with other methods of protection (coatings, or cladding or cathodic protection).

L.U.

1. Steel--Heat treatment 2. Steel--Corrosion 3. Steel--Fatigue
4. Steel--Hardening--Effects

Card 2/2

137-58-1-1365

Translation from Referativnyy zhurnal Metallurgiya 1958, Nr 1, p 186 (USSR)

AUTHORS: Glikman, L. A., Sudrun, L. A., Bogorad, L. Ya., Gakman, E. L.

TITLE: Effect of Chromium Plating on the Fatigue and Corrosion Fatigue Strengths of Steel (Vliyaniye khromirovaniya na ustalostnuyu i korrozionnoustalostnuyu prochnost' stali)

PERIODICAL: Tr. Tsentr. n.-i. in-ta morsk. flota, 1956, Nr 5, pp 36-42

ABSTRACT: The results of an investigation of the effects of the chromium plating procedure employed upon the fatigue strength (FS) and the fatigue corrosion strength (FCS) of specimens of Nr 35 carbon steel subjected to heat treatment are presented. When tested for FCS the midsection of the specimen was in a flowing liquid medium (3% NaCl). Seven chromium platings differing as to plating procedure and the condition of the Cr coating, were tested. The chromium plating (C) of all the specimens was performed in a bath with an electrolyte of identical composition (in g/l): CrO_3 150, H_2SO_4 1.5. It was found that C differs in its effect upon FS when tested in air, depending on the plating procedure. For specimens coated with bright and cloudy Cr, significant diminution in the FS of the parent metals was found

Card 1/2

Effect of Chromium Plating on the (cont.)

which is explained by the presence in the coating of residual tensile stresses, and the positive effect of tempering at 550-600°C was confirmed, as it restored the FS almost completely. In porous chromium plating, no reduction in FS was revealed, and this is explained by the significantly diminished magnitude (due to general development of a network of cracks) of residual tensile stresses in such coating. Corrosion fatigue tests showed that C provides unsatisfactory protection against reduced FS of steel under conditions of corrosion. Tempering after C has virtually no effect on the FCS of steel; all tests revealed a comparatively small difference between the curves for corrosion fatigue of C and of non-chromium-plated specimens. A strict relationship between the corrosion strength and the number of cycles was found to exist in both categories. The use of a supplementary 2-layer Ni and Cu coating beneath the Cr does not improve the protective properties of the coating. A significant improvement in the protection against reduction in FS against corrosion of specimens covered by bright Cr was attained only with a preliminary two-hour heating of the chromium-plated specimens in flaxseed oil at 140-150°. In the opinion of the authors, the unfavorable effect of Cr coatings upon the FCS of steel is explained by the appearance of cracks in the coating under cyclic loads, these cracks serving as channels leading the corrosive medium to the parent metal.

Card 2/2 L. U

1. Steel--Plating 2. Steel--Corrosion 3. Chromium plating--Effects

SOV 124-58-3-3518

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 3, p 130 (USSR)

AUTHOR: Glikman, L. A

TITLE: Stability of Residual Stresses and Their Effect on Mechanical Properties of Metal and Strength of Components (Ustoychivost' ostatochnykh napryazheniy i ikh vliyaniye na mekhanicheskiye svoystva metalla i prochnost' izdeliy)

PERIODICAL: Tr. Leningr. inzh.-ekon. in-ta, 1956, Nr 13, pp 145-203

ABSTRACT: After analyzing experimental investigations (performed by Glikman as well as by other authors) the results of which are recorded in technical literature the author presents the following conclusions: 1) Stability (preservation) of residual stresses in steels is very great (the reduction amounts to 6-8%) even after prolonged periods at room temperature; at temperatures of 300°C and higher the residual stresses diminish considerably 2) Under static loading the residual stresses are preserved until the summary stresses (residual stresses plus stresses due to external loads) exceed the elastic limit; the residual stresses are relieved when residual deformations equivalent to 0.5 1% appear. 3) Under cyclic

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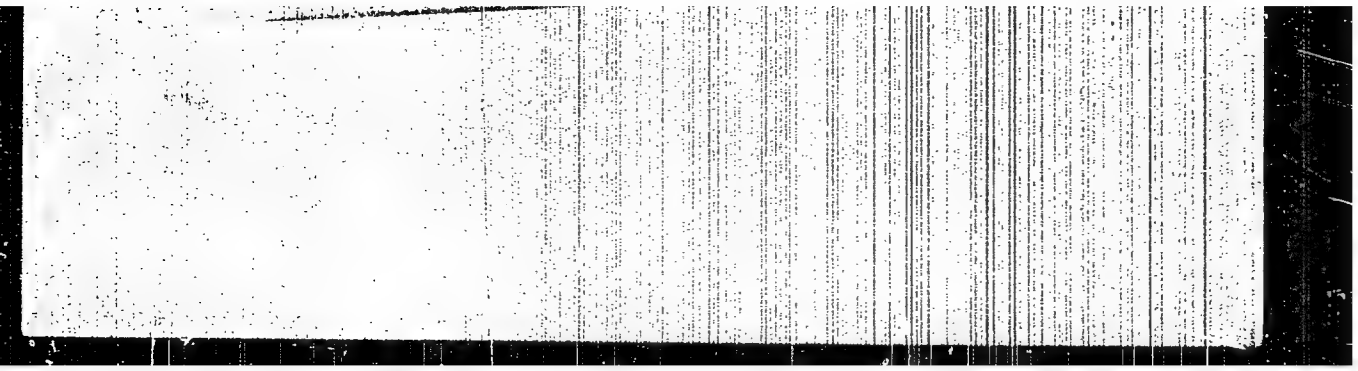
Stability of Residual Stresses (cont.)

loading, the residual stresses diminish noticeably when the summary stresses exceed the cyclic elastic limit. Reduction of residual stresses by the action of cyclic loads is not recommended. 4) Strength of plastic materials is not affected by residual stresses; this holds true for materials in uniform as well as nonuniform states of stress. In the case of a uniformly stressed material residual stresses bring about a reduction of the limits of proportionality, elasticity, and yielding. 5) In the case of brittle materials and plastic materials with tendencies toward brittle fracture (under conditions of reduced temperature, increased loading rates, notching) residual stresses always reduce the strength of uniformly stressed materials and, depending on their distribution, either lower or increase the strength of materials which have been stressed nonuniformly. 6) Residual stresses of linear or planar nature do not affect the susceptibility of metals to brittle fracture; residual stresses of three-dimensional character, however, may cause the metal to become brittle. 7) Residual compressive stresses in the surface layer increase fatigue resistance of materials during bending, whereas residual tensile stresses impair this property (by reducing the cycle amplitude at the fatigue limit). Bibliography: 86 references.

A. D. Kovalenko

Card 2/2



KASHCHENKO, Georgiy Antonovich, professor; GLIKMAN, L.A., professor, doktor tekhnicheskikh nauk, redaktor; LEYKINA, T.L., redaktor izdatel'stva; BOICHOVITINOV, N.F.professor, doktor tekhnicheskikh nauk, professor, retsenzent; SOKOLOVA, L.V., tekhnicheskiy redaktor.

[Principles of physical metallurgy] Osnovy metallovedeniia. Izd.3-e, dop. i perer. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1957. 395 p. (MLRA 10:6)
(Physical metallurgy)

GLIKMAN, L. A.

AUTHOR: Glikman, L.A., Doctor of Technical Sciences, Stanyukovich, A.V., Candidate of Technical Sciences and Chizhik, A.I., Engineer. 114-11-5/10

TITLE: Heat-resistant Materials for Power Machinery Building. (Zharoprochnyye materiyaly dlya energomashinostroyeniya)

PERIODICAL: Energomashinostroyeniye, 1957, Vol.3, No.11, pp. 22 - 26 (USSR)

ABSTRACT: The article commences with a statement of the importance of studying mechanical properties of metals at high temperatures and with a review of early work on this subject in the USSR.

After the war, work developed extensively on the study of the properties of heat-resistant materials. New laboratories for this purpose were set up in the Central Scientific Research Institute of Engineering Technology (TsNIITMASh), the Central Scientific Research Institute for Ferrous Metallurgy (TsNIIChERMET) at the Neva Works imeni Lenin (NZL), the Kharkov Turbine Works (KhTZ) and elsewhere and the laboratories at the Central Boiler Turbine Institute (TsKTI) and the Leningrad Metal Works (LMZ) were extended. In the solution of metallurgical problems involved in the manufacture of new heat-resistant materials, a leading part has been played by such enterprises as "Elektrostal", the Ural Engineering Works (Uralmashzavod), the Neva Works

Card 1/7

imeni Lenin, the New Kramatorsk Engineering Works (NKMZ) and others.

A detailed study was made of the kinetics of failure over a long time and of the kinetics of structural changes in the properties of materials exposed to high temperatures for a long time. As a result of this work it was possible to draw up a number of analytical relationships. An example is given of such a relationship between the long-term ultimate strength of heat-resistant steel and the temperature. This formula includes a coefficient which varies greatly from one steel to another and appropriate values may be taken from the graph given in Fig.1. The accumulation of test data on long term failure made it possible to develop the general view of the changes that take place in plastic properties at high temperatures as a function of the mean rate of creep and time to failure. It was shown that the development of inter-crystalline failure with a reduction in the rate of creep or with increase in the test time leads to the appearance of a range of rates of creep in which there is a marked reduction in the plasticity and increase in the brittleness. Changes in the plastic properties of a number of steels as a function of the mean rate of creep are shown in Fig. 2.

Card 2/7 Work on heat-resistance carried out in the Central Boiler

Turbine Institute and at Leningrad University resulted in the derivation of a relationship between the quantity of metal reacting with oxygen and the time. A great deal of work was done on the ageing of high alloy steel by study of the structure and properties of a group of steels after lengthy exposure to high temperature. It was shown that, for a number of materials, identical structures can be obtained at different ageing temperatures by altering the test time. For many materials, the structural condition can be related to the impact strength. This is very useful in maintenance work. Procedures have been developed for studying the fatigue strength at high temperatures.

Recently, more attention has been paid to physical methods of investigation, such as determination of thermal conductivity and temperature coefficient of expansion.

Experimental results on creep in pipes under pressure have been compared with results of the usual tension tests and a method has been developed for calculating the equivalent stress in pipes under pressure from the results of tests on ordinary specimens that is applicable to all boiler steels (See Fig.5).

The development of the first boilers and turbines for super-high steam conditions provided a great stimulus to the investigation of heat-resistant materials. Examples of heat-resistant

materials which have been developed and investigated in detail and which have found wide application in power engineering are listed in a table. The table lists 16 brands of steel and for each gives the heat treatment, the test temperature, the mechanical properties, the creep limit and the long-term ultimate strength.

In the article special mention is made of certain steels. Steel P-2 is widely used for forged rotors. Another heat-resistant rotor material is chrome-tungsten-molybdenum steel ЭИ- 415 which has high structural stability.

An important pearlitic steel for casting is brand 20ХМФЛ which is used at operating temperatures of up to 540 °C. Use is now beginning to be made of a new cast-chrome-molybdenum-vanadium steel 15Х1М1Ф which can be recommended for parts operating at temperatures up to 570 °C. A series of new pearlitic steels has been developed for super-heater tubes and steam pipes. Steel 12ХМФ intended for operation at temperatures of up to 570 °C is an example and so are steels ЭИ-531 and ЭИ-454. A major task at the present time is to extend the use of cheaper steels with favourable technological properties. Work is being carried out on the development of new steels. Particularly interesting results have been obtained with materials based on stainless 12% chromium steel which also contains such elements as molybdenum,

tungsten, vanadium and niobium to a total content of 1-3%. These steels are used after heat treatment. Steels of this kind are 15Х11МФ, 15Х12ВМФ and 1Х12В2МФ. Variants of cast-chromium heat-resistant steels are of considerable interest; materials of these kinds are steels Х11ЛБ and Х11ЛА.

Since the war, investigational work and developments in metallurgical work on casting and forging have led to the development of a series of heat-resisting austenitic steels. One of the first of these which has been studied in the most detail is steel ЭИ-405 which has satisfactory technological properties and sufficiently high heat-resistance to combine with good structural stability. It has been used for the manufacture of blades and a number of other parts of turbines for super-high steam conditions and for gas turbines. During development work on the welded rotor for a gas turbine several large parts were made from this steel using different manufacturing procedures. The parts were subsequently tested at the Leningrad Metal Works and the Central Boiler Turbine Institute and it was found necessary to improve the quality of ingots and the technology of hot working. A good deal of work was done on the welding of this steel.

Steel ЭИ-572 has been manufactured and rolled by the "Elektrostal" Works and investigated in detail by the Central Boiler

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Turbine Institute. It has a high relaxation stability and low sensitivity to the presence of cuts so that it is very suitable for the manufacture of studs and bolts intended to operate at temperatures of up to 580 °C, and also for large forgings for gas turbine discs and rotors.

Steel ЭИ-612, a chrome-nickel austenitic steel alloyed with tungsten and titanium, has been developed. It has good mechanical properties in the temperature range 20 - 650 °C. The impact strength is maintained at a high value after prolonged ageing at 650 - 700 °C.

A great deal of work has been done on the development and use of cast austenitic steel. One such steel is brand ЛА1 which has high heat-resistance and stability so that it can be used at working temperatures of up to 650 °C. Considerable difficulties had to be overcome in the manufacture of castings of heat-resistant austenitic steels because of their tendency to form films, which leads to the formation of various defects on the surface of the ingots. These defects are found in all existing austenitic heat-resistant steels. Reliable welds can be made of these steels only in regions from which such defects and porosity are completely absent. A good deal of work has been done on cast austenitic steel Х25Н13Т-Л which has been used for

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Heat-resistant Materials for Power Machinery Building. 114-11-5/10

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AUTHORS: Glikman, L.A., Dr. of Technical Sciences, Prof. and Zobachev, Yu. Ye., Candidate of Technical Sciences. (Central Marine Research Institute).

TITLE: Influence of shot peening on the cavitation resistance of metals tested by means of a magneto-striction vibrator. (Vliyaniye drobestruynogo naklepa na kavitatsionnuyu stoykost' metallov pri ispytanni na magnitostriktsionnom vibratore).

PERIODICAL: "Metallovedenie i Obrabotka Metallov" (Metallurgy and Metal Treatment), 1957, No.5, pp.38-41.(U.S.S.R.)

ABSTRACT: Grossman (2) found that shot peening has a favourable influence on cavitation resistance but his results were not unequivocal. In this paper the results are described of experiments aimed at studying the influence of shot peening on the cavitation resistance of carbon steels containing 0.4 and 0.53% C, on brass and on an austenitic steel. Specimens were made of these materials which were subjected to cavitation tests on a magnetostriction vibrator after shot peening. The depth of the work hardened layer was 0.2 to 0.25 mm for the austenitic steel and 0.1 to 0.15 mm for the brass. The authors did not detect any appreciable influence of shot peening on the cavitation strength. The shot peened surface layer increases somewhat the resistance of the metal to plastic deformation but this increase

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Influence of shot peening on the cavitation resistance of metals tested by means of a magnetostriction vibrator. (Cont.)

is not large enough to reduce appreciably local plastic deformation caused by the mechanical effect of the hydraulic impacts during the collapse of bubbles. The relatively slight increase in the strength of the surface layer does not compensate the adverse influence caused by the decrease in the corrosion stability of the metal. 4 Tables; 5 Russian, 1 American references.

Card 2/2

129-10-9/12

AUTHOR: Glikman, L.A., Doctor of Technical Sciences, Professor, and Babayev, A.M., Candidate of Technical Sciences.

TITLE: Cases of fatigue fractures of marine shafts. (Ustalostnaya prochnost' obraztsov, naplavlennykh avtomaticheskoy svarkoy pod flyusom)

PERIODICAL: "Metallovedeniye i Obrabotka Metallov" (Metallurgy and Metal Treatment), 1957, No.10, pp.37-43 (U.S.S.R.)

ABSTRACT: There were cases of fatigue fractures of marine shafts which, after wear and corrosion, were dimensionally restored by welding. Therefore, the authors decided to determine the fatigue strength of specimens with deposits produced by automatic welding under flux. Earlier, one of the authors (3) studied the technology and the method of selection of welding regimes, aimed at obtaining the necessary mechanical properties and absence of cracks in the thermally influenced zone and in the weld zone. Furthermore, the influence was studied of the temperature of preliminary heating and also of the geometry of the weld deposit on the magnitude and distribution of the residual stress. The experiments were made with specimens of 60 mm dia. since preliminary tests showed that this diameter permitted welding along the generatrix, along a spiral at an angle of 45° and along a ring. The specimens were made of steel 40, the compo-

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Cases of fatigue fractures of marine shafts. 129-10-9/12 (Cont.)

sition of which was as follows: 0.4% C, 0.26% Si, 0.57% Mn, 0.033% S and 0.022% P; the mechanical properties after annealing at 840 C were σ_s = 28 kg/mm^2, σ_b = 58 kg/mm^2, δ_5 = 25% and ψ = 45%. The welding was effected with direct current of reverse polarity. The graph, Fig. 2, shows the results of fatigue tests of specimens in the original state, after restoration by welding along the generatrix, after restoration by welding along the spiral at 45°, after restoration by welding along the ring and also after restoration by welding followed by work-hardening by means of rolls and restoration by welding followed by tempering for two hours at 630 C. The various mechanical properties, after different regimes of restoration and treatment, are plotted in the graphs, Figs. 3 to 6. It was found that the fatigue limit of specimens with weld deposits amounted to only about 36% of the fatigue limit of the metal in the original state and was independent of the angle between the direction of feeding the weld deposit and the specimen axis. Tempering for 2 hours at 630 C improves the fatigue limit of the specimens with weld deposits to 10 kg/mm^2, whilst for specimens which were work-hardened by rolls with a pressure of 600 kg the fatigue limit increased to 14 kg/mm^2; these values represent 44% and 64% respectively of the fatigue

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Cases of fatigue fracture of marine shafts. (Cont.)

limit of the metal in the original state. The most likely cause of the low fatigue limit of the specimens with weld deposits consists of the simultaneous action of residual tensile stresses and welding defects which play the rôle of stress concentrators; these defects are, in the given case, of fundamental importance.

There are 6 figures, 2 tables and 10 references, 9 of which are Slavic.

ASSOCIATION: Central Marine Scientific Research Institute (TsNII) and Leningrad Ship-building Institute (Leningradskiy Korablestroitelnyy Institut)

AVAILABLE: Library of Congress

Card 3/3

GLIKMAN, L.A.; SUPRUN, L.A.; KOSTROV, Ye.N.

Method for corrosion fatigue testing of specimens 60mm in diameter. (MLRA 10:6)
Zav. lab. 23 no.3:343-345 '57.
(Corrosion and anticorrosives) (Metals--Fatigue)

GLIKMAN, L. A.

AUTHOR: Kolgatin, N.N., Glikman, L.A., Teodorovich, V.F. 32-9-21/43

TITLE: A Method for Long-Duration Tension Tests of Tube-Shaped Samples With Internal Hydrogen Pressures at High Temperatures (Metodika dlitel'nykh ispytaniy na razryv trubchatykh obraztsov pod vnutrennim davleniyem vodoroda pri vysokikh temperaturakh)

PERIODICAL: Zavodskaya Laboratoriya, 1957, Vol. 23, Nr 9, pp 1098-1101 (USSR)

ABSTRACT: A special plant and a special method of investigation, by which internal hydrogen pressures and the influence exercised by them on the refractoriness of the tubes (or, to be more accurate, upon their fatigue limit) are developed. There follows a description of the plants and of the experimental method. The sample is heated in an electric furnace up to the given temperature for 4-5 hours with a subsequent pause of 1 hour. Next, hydrogen is introduced through a valve until in the sample any pressure corresponding to the amount of tension in the walls of the sample is attained. The amount of this tension is computed according to a formula. In order to ascertain the influence exercised by hydrogen upon the fatigue limit analogous investigations were carried out in nitrogen. It is shown that hydrogen exercises a considerable influence upon the reduction of the fatigue limit of steel "20" at 400, 450 and 500°. At all test temperatures and different times needed for the tearing of

Card 1/2

32-9-21/43

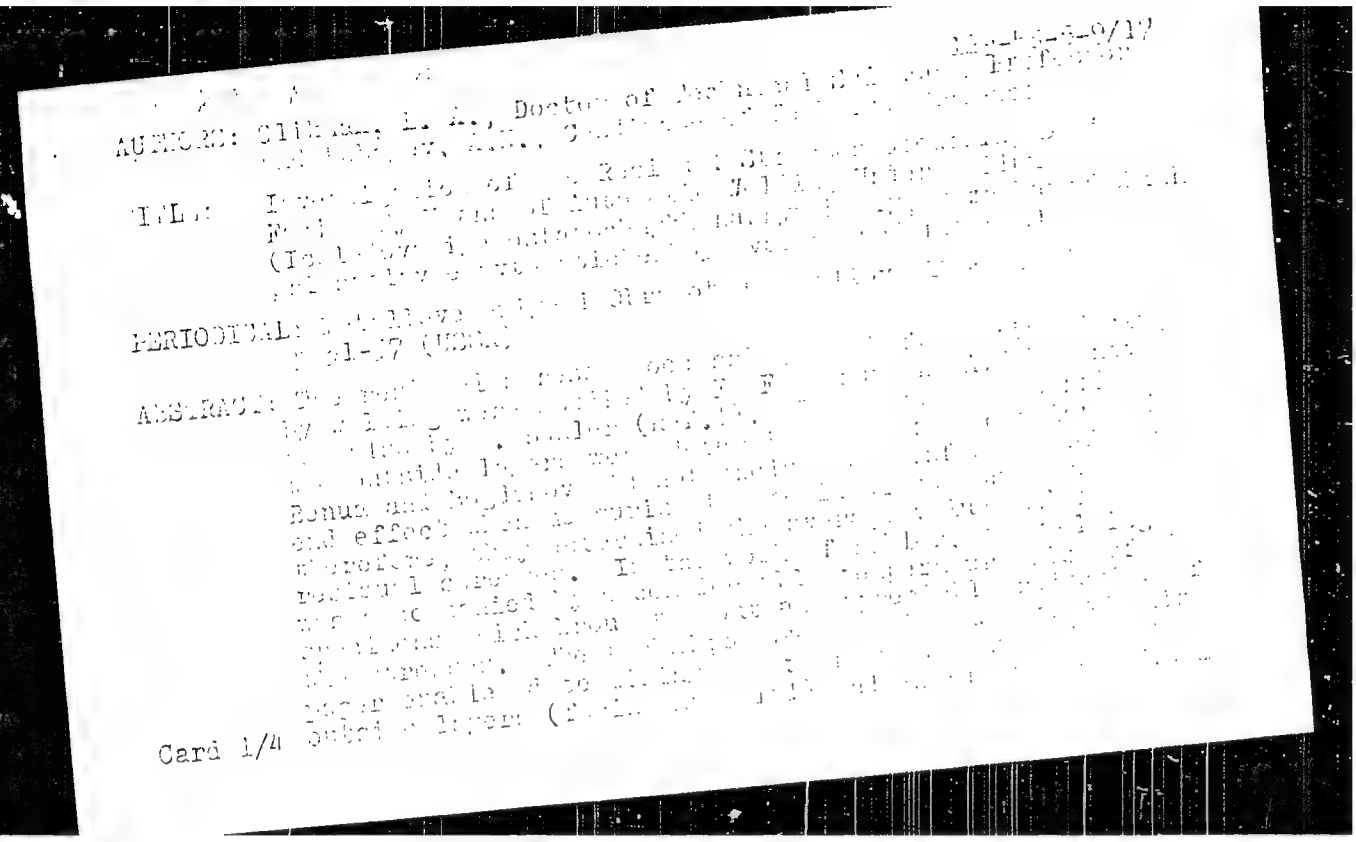
A Method for Long-Duration Tension Tests of Tube-Shaped Samples With Internal Hydrogen Pressures at High Temperatures

the samples of steel "20" in hydrogen, the character of destruction was observed to be brittle. An investigation of the same type of steel in nitrogen during a relatively short duration of testing showed that the destruction of the tubes was accompanied by considerable plastic deformation. It was found that the destruction of steel "20" with internal hydrogen pressure always takes place at the granular boundaries. The plant described permits a simultaneous investigation of a relatively large number of samples of tubes. There are 7 figures and 7 references, 3 of which are Slavic.

ASSOCIATION: Leningrad Institute for Petroleum Refining and for the Production of Artificial Liquid Fuels (Leningradskiy institut po pererabotke nefti i polucheniyu iskusstvennogo zhidkogo topliva)

AVAILABLE: Library of Congress

Card 2/2



AUTHOR: Doctor of

TITL:

PERIODICAL:

ABSTRACT:

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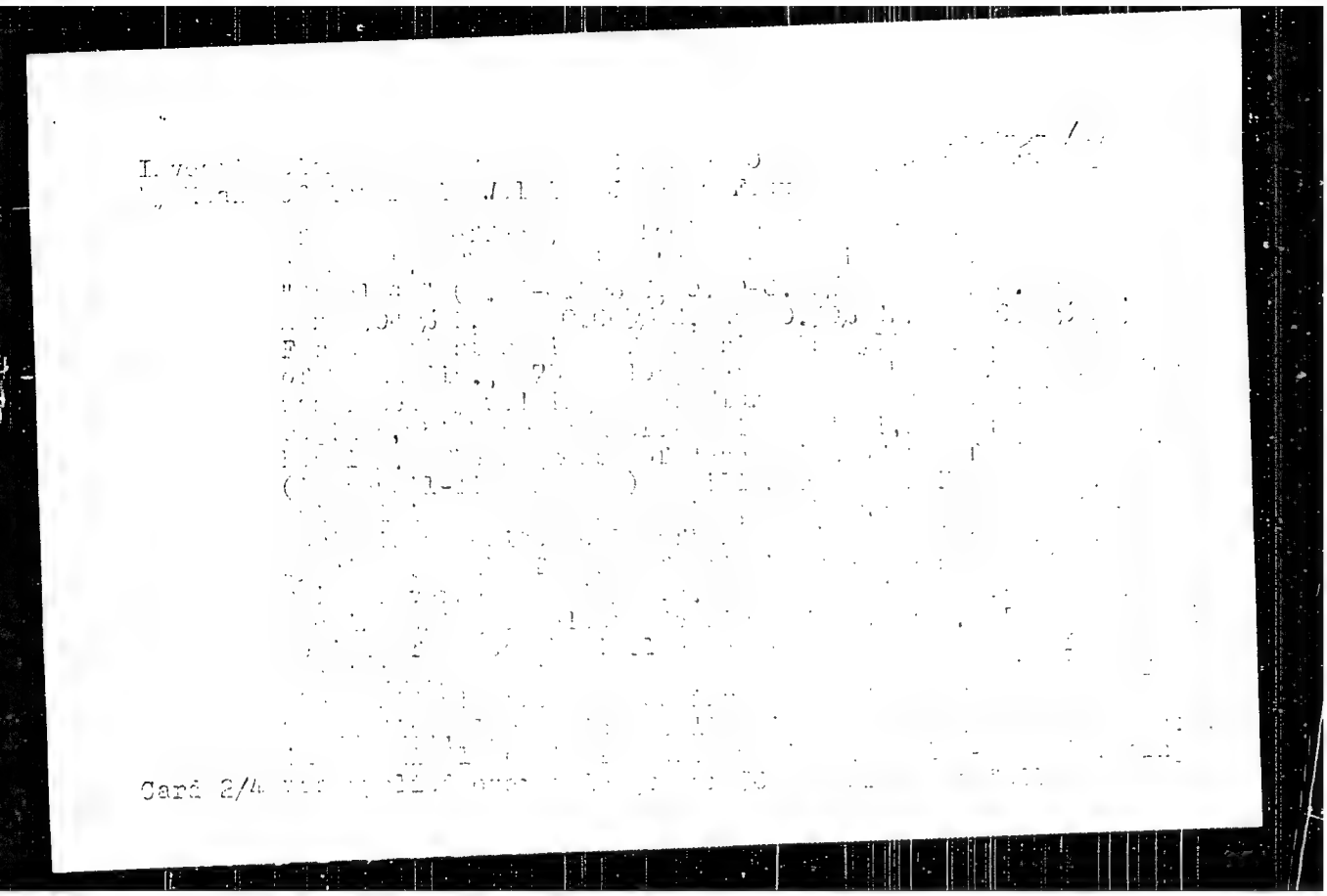

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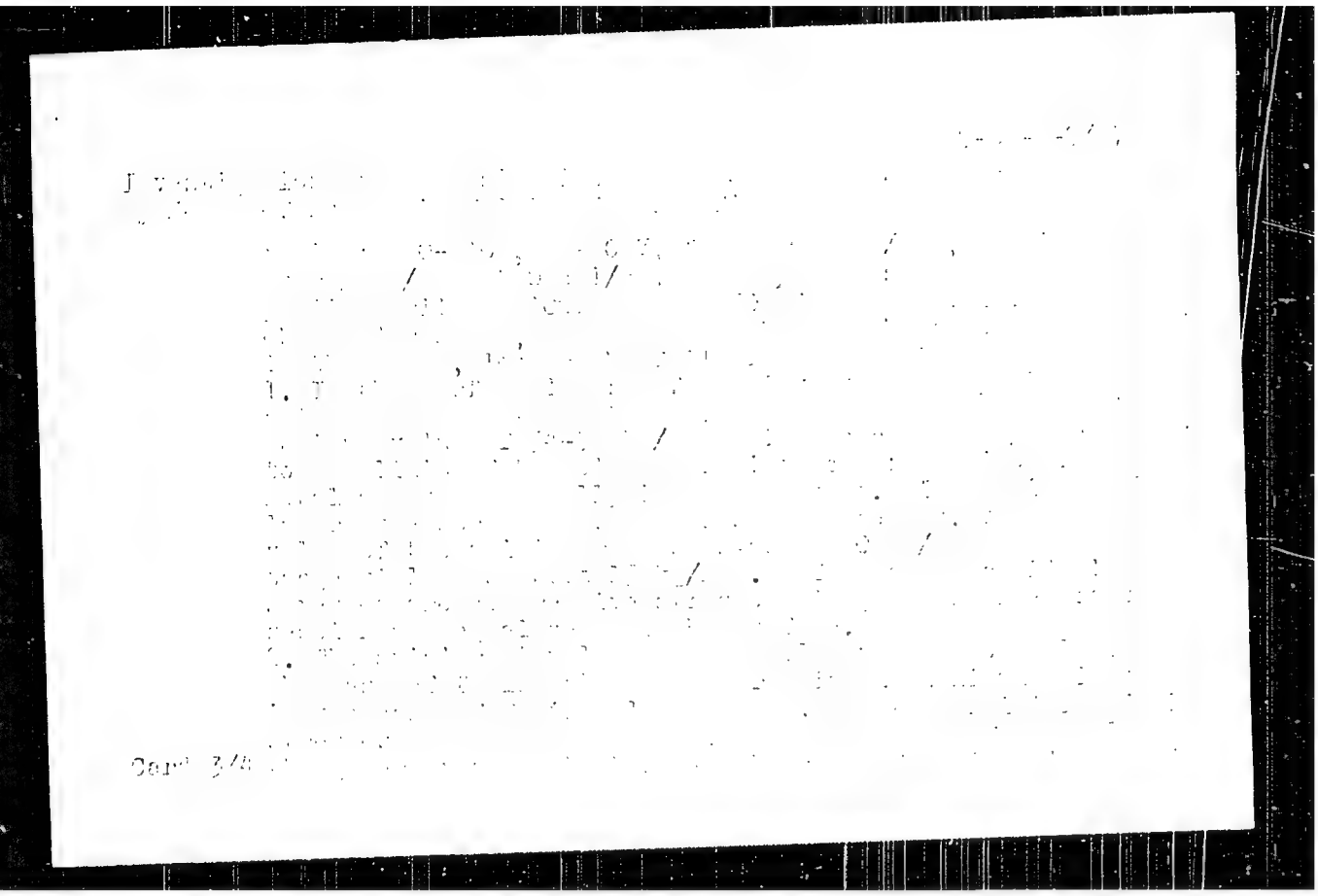

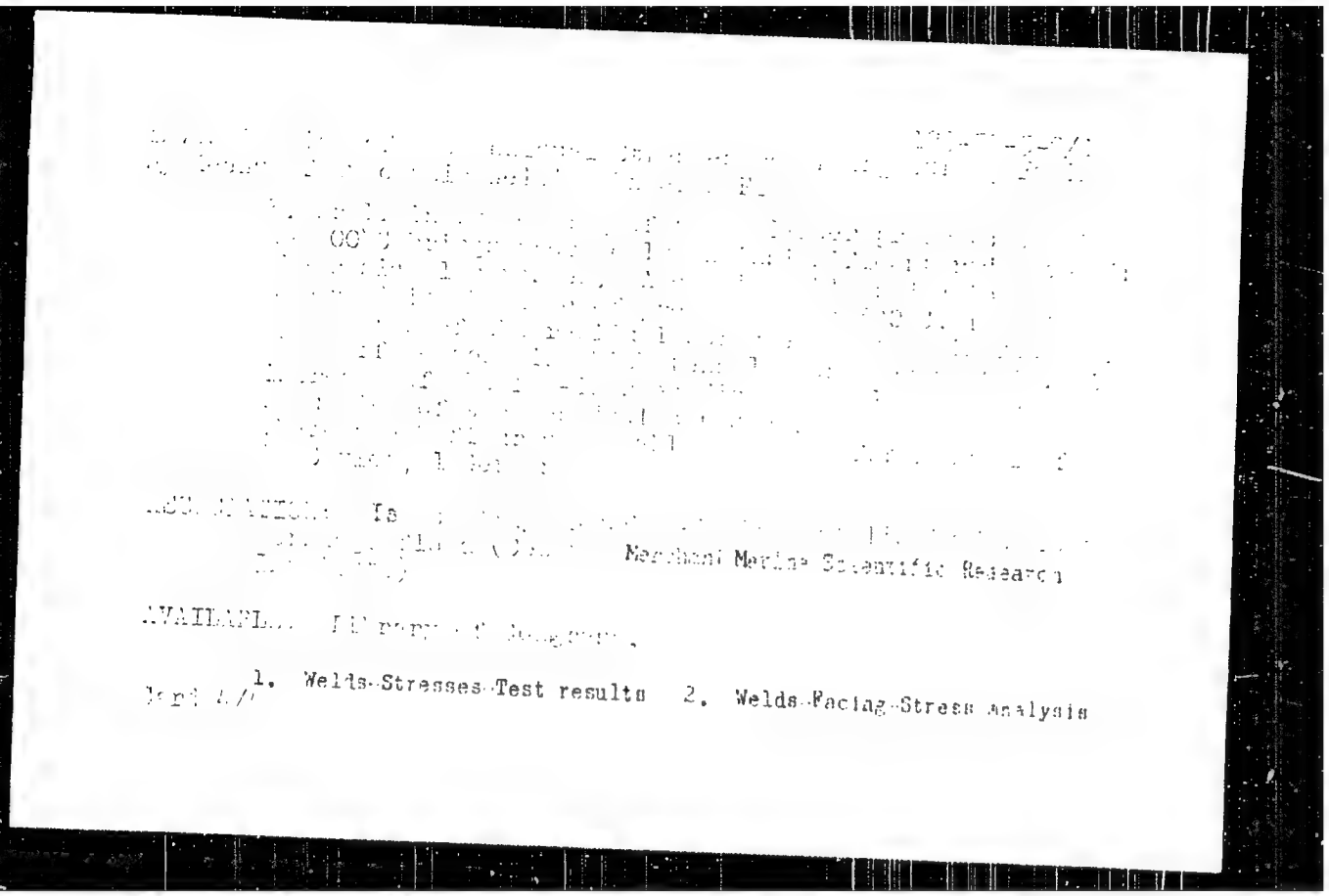

Merchant Marine Scientific Research

1. Welds-Stresses-Test results 2. Welds-Facing-Stress Analysis

GLIKMAN, L.A., doktor tekhn.nauk, prof.; BABAYEV, A.N., kand.tekhn.nauk

Investigating residual stresses in steel cylinders caused by building up the surface by means of automatic welding with flux. Trudy LIEI no.23:18-26 '58. (MIRA 12:5)
(Strains and stresses) (Electric welding)

GLIKMAN, L.A., doktor tekhn.nauk, prof.; KOSTROV, Ye.N., inzh., aspirant

Effect of the scale factor on the fatigue strength of steel.
Trudy LIEI no.23:27-45 '58. (MIRA 12:5)

1. TSentral'nyy nauchno-issledovatel'skiy institut Morskogo flota (for Kostrov).
(Steel--Fatigue)

GLIKMAN, L.A., doktor tekhn.nauk, prof.

Problem of the physical nature of mechanical aging. Trudy LIBI no.23:118-123 '58. (MIRA 12:5)
(Metals--Testing)

GLIKMAN, L.A.; KOSTROV, Ye.N.; SUPRUN, L.A.; YELIN, I.A.; SHCHERBAKOV, P.S.; ZOBACHEV, Yu.Ye.; DOBRER, V.K.; STRUMPE, P.I., kand.tekhn.nauk, otv. red.; ARAKELOV, V.M., nauchnyy red.; BAMA, N.G., red.; KOTLYAKOVA, O.I., tekhn.red.

[Organization and technology of ship repair; corrosion and mechanical strength of metals] Organizatsiia i tekhnologiia sudoremonta; voprosy korrozionno-mekhanicheskoi prochnosti metallov. Leningrad, Izd-vo Morskoi transport 1959. 76 p. (Leningrad. tsentral'nyi nauchno-issledovatel'skii institut morskogo flota. Trudy no.22) (MIRA 12:5)
(Metals--Testing) (Corrosion and anticorrosives)

ALIMAN - A

PART I BOOK EXPLOITATION SOV/3742

Metallovedeniye; sbornik statey, No. 5 (Physical Metallurgy; Collection of Articles, No. 5), Leningrad, Sudpromgiz, 1959. 340 p. 5,500 copies printed.

Ed.: G. I. Kapustin, Candidate of Technical Sciences; Literary Ed. Ed.: M. I. Dorosenko.

PURPOSE: This collection of articles is intended for scientific personnel at research and educational institutions and industrial plants and also for advanced students.

COVERAGE: The articles report the results of investigations of 1) the effect of various factors on the susceptibility of austenitic steels to brittle failure at various temperatures under various conditions of loading (impact, short-time, static, long-time, etc.) and the conditions of loading as related to their mechanical properties, structure, and condition of alloys as related to their mechanical properties, and 2) corrosion resistance and evaluation of stainless and heat-resistant steels. The articles are accompanied by numerous Soviet and non-Soviet references. No personalities are mentioned.

Zav'yalov, A. S., Doctor of Technical Sciences, Professor. Nature of Steel's Embrittlement Processes During Heating and the Effect of Alloying Elements on Them

Tsylov, Yu.D., Candidate of Technical Sciences; N. A. Tylkina, Engineer; and Yu. A. Mironenko, Technician. Effect of Nitrogen and Chromium on the Brittleness of Chrome-Manganese-Nickel Austenitic Steel

Kogan, L. S., Doctor of Technical Sciences; and V. E. Kuzmin, Engineer. Mechanism of Hydrogen Embrittlement in Steel

Glikman, L. A., Doctor of Technical Sciences; N. D. Kolganova, Engineer; V. P. Pedchenko, Candidate of Technical Sciences; and V. I. Pogodin, Engineer. Change in Mechanical Properties of Carbide Steels Under the Action of Hydrogen at High Temperatures and Pressures

Kogan, L. S., and Yu. D. Kotov, Engineer. Investigation of the Mechanism of Hydrogen Embrittlement of Titanium and Its Alloys

Bakhtin, B. I., Candidate of Technical Sciences. Role of Intermediate Structures in the Heat Treatment of Medium-Alloy Constructional Steel

Gol'dshteyn, L. Ya., Engineer. Stability of Structure and Properties of Tempered Steel

Pevzner, P. G., Candidate of Technical Sciences. Microanalysis and Microscopic Cracks in Steel

Chernenko, V. I., Engineer. Sensitivity of Titanium and Its Alloys to Brittle Failure Under Nonsymmetrical Loading

Glazkova, E. B., Candidate of Technical Sciences. Investigation of the Embrittlement Caused by Sigma and Chi Phases and Their Effect on Failure Creep in Testing Steel for Mechanical Properties

Pashkov, P. O., Doctor of Technical Sciences, Professor. Some Problems on the Strength of Metals as Related to Their Microstructure

Shchukin, B. A., Candidate of Technical Sciences. Investigation of the Initial Portions of Stress-Strain Curves and Determination of Stresses for Quench-Hardened Steel

307/129-59-3-5/16

AUTHORS Kolgavin, N.N. Engineer, Glikman, L.A. Doctor of Technical Sciences Professor, Teodorovich, V.P., Candidate of Chemical Sciences and Daryabina, V.I., Engineer

TITLE Sustained Strength of Steels During Investigation of Tubular Specimens Subjected to an Internal Pressure of Hydrogen at Elevated Temperatures (Dlitel'naya prochnost' stali pri ispytanii trubchatykh obraztsov pod vnutrennim davleniyem vodoroda pri vysokikh temperaturakh)

PERIODICAL Metallovedeniye i Termicheskaya Obrabotka Metallov 1959, Nr 3 pp 19 - 24 (USSR)

ABSTRACT A.A. Zakharov (Ref 1) and Sh.N. Kats (Ref 2) have established that in certain calculations of the stresses in tubes subjected to internal pressures by a neutral medium the sustained strength at elevated temperatures equals the sustained strength in ordinary tensile tests. Therefore it is possible to use the results of sustained tensile tests for calculating the permissible stresses In a number of cases the permissible stresses can be chosen correctly only by taking into consideration the

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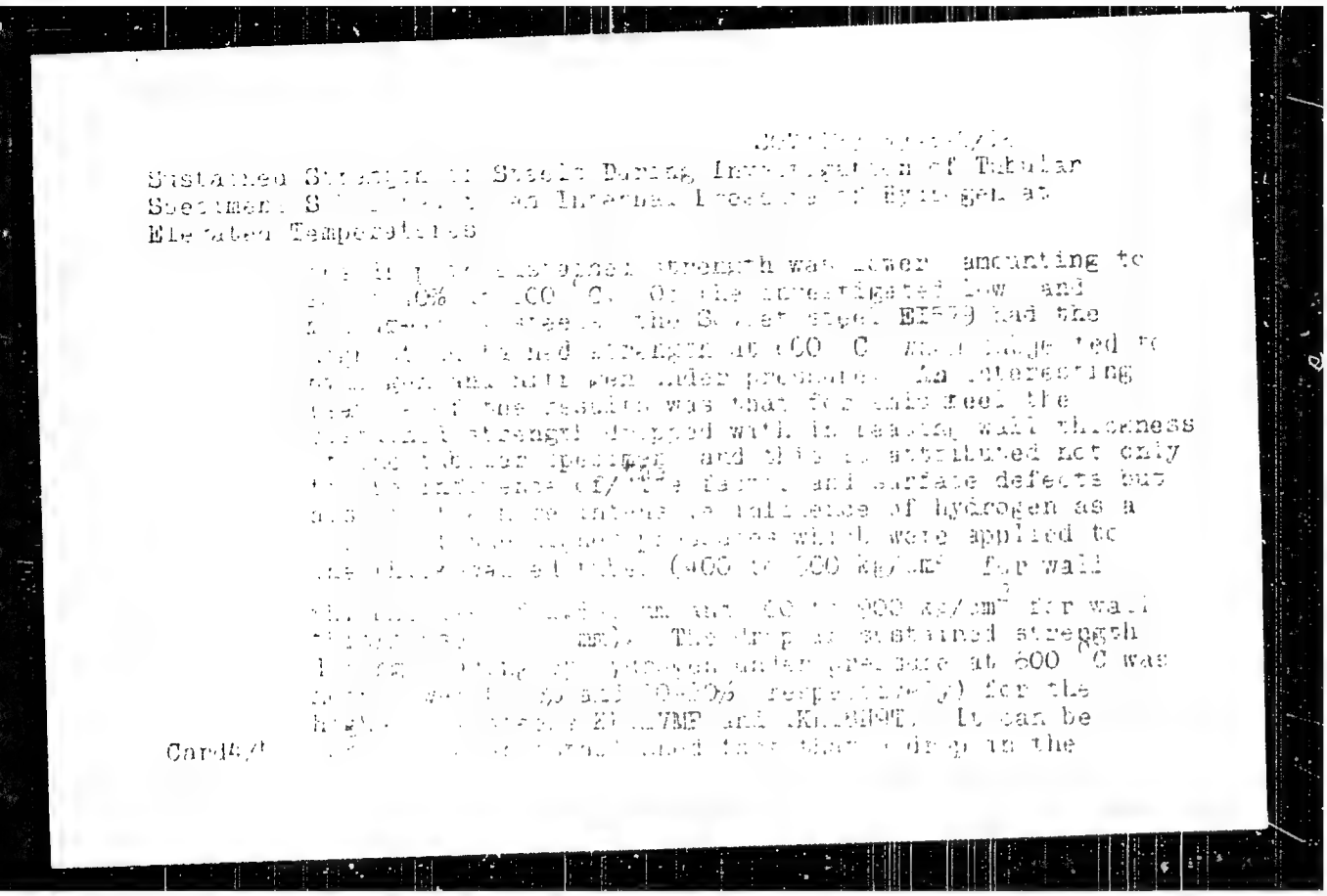
Sustained Strength of Steels During Investigation of Tubular Specimens Subjected to an Internal Pressure of Hydrogen at Elevated Temperatures

influence of the aggressive media which produce the internal pressures inside the tubes at the particular elevated temperatures Of such aggressive media, hydrogen is of considerable importance The authors of this paper have produced a test rig and evolved a method of testing for sustained failure of tubular specimens which are subjected to internal pressure of various media at elevated temperatures. This test rig has been described in earlier work of some of the authors of this paper (Ref 3). In the here described work it was applied for studying the sustained strength of tubular specimens of various steels subjected to internal pressure of hydrogen and nitrogen at elevated temperatures. As a neutral medium, molecular nitrogen was chosen which enabled evaluating the influence of hydrogen on the sustained strength of the tubes. The chemical compositions and the mechanical properties of the investigated (8) steels are entered in Tables 1 and 2. In addition to these, steel containing 6% Cr

Sustained Strength of Steels During Investigation of Tubular Specimens Subjected to an Internal Pressure of Hydrogen at Elevated Temperatures

and supplementary additions of W, V, Mo and Nb was studied. Of the eight materials enumerated in Table 1, the tests on commercial iron were carried out at 450 °C and the respective results are graphed in Figure 1. A sharp drop in the sustained strength was observed for tubular specimens subjected to internal pressure of hydrogen, brittle failure with a pronounced intercrystalline character was observed, whilst in equal specimens subjected to internal pressure with nitrogen the failure was accompanied by appreciable plastic deformation and the failure was intracrystalline. The results for the other materials tested are also graphed. On the basis of the measured strength data for sustained loading for durations of 1 000 and 10 000 hours it can be concluded that hydrogen has a considerable influence on the reduction of the sustained strength, particularly in the case of commercial iron and steel 20; at 450 °C these materials suffered a loss of 75 to 85% of their sustained strength. For low and medium alloy steels



Sustained Strength of Steels During Interaction of Tubular Specimens [illegible] an Internal Pressure of Hydrogen at Elevated Temperatures

[illegible] hydrogen strength was lower amounting to [illegible] 40% at 500 C. Of the investigated low and [illegible] steels the Soviet steel EI579 had the [illegible] sustained strength at 500 C which ledto [illegible] was not even under pressure. An interesting [illegible] of the results was that for this steel the [illegible] strength dropped with increasing wall thickness [illegible] specimens and this is attributed not only [illegible] presence of/the fatty and surface defects but [illegible] to intense penetration of hydrogen as a [illegible] which were applied to [illegible] (400 to 500 kg/cm² for wall [illegible] cm at 500 to 900 kg/cm² for wall [illegible] mm). The drop in sustained strength [illegible] of hydrogen under pressure at 500 C was [illegible] and 30-50% respectively) for the [illegible] steels EI579 and EI961, it can be [illegible] used than a drop in the

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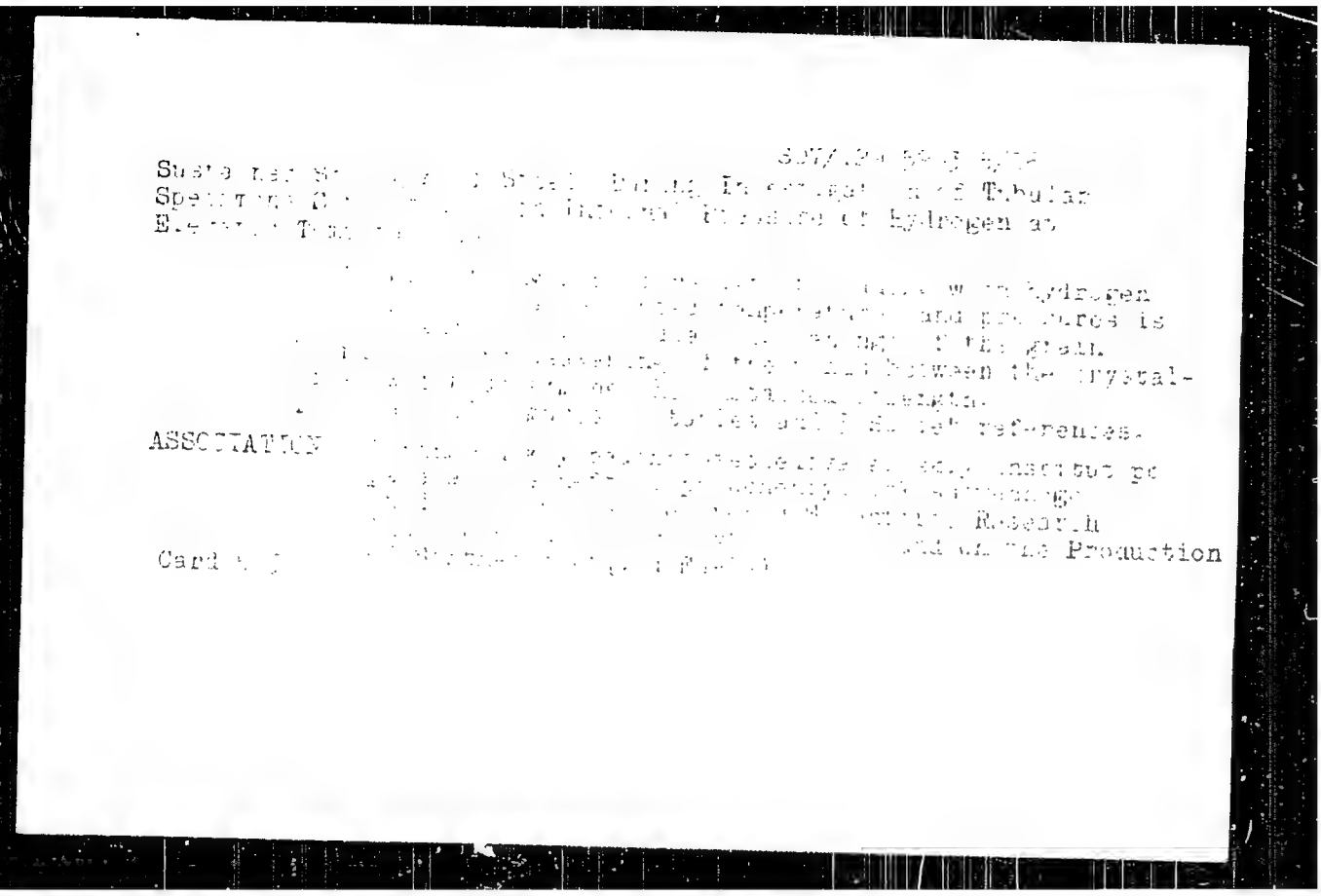

ASSOCIATION

GLIKMAN, L.A., doktor tekhn.nauk, prof.; KOLGATIN, N.N., inzh.; TEODOROVICH, V.P., kand.khimicheskikh nauk; DERYABINA, V.I., inzh.

Changes in the mechanical properties of certain steels under the effect of hydrogen at high temperatures and pressures. Metallovedenie 3:58-73 '59. (MIRA 14:3)
(Steel—Hydrogen content)
(Metals at high temperature)

28(5) SOV/32-25-4-31/71

AUTHORS: Glikman, L. A., Kostrov, Ye. N., Dobre., V. K.

TITLE: Tests for Corrosion Fatigue in Bending and Torsion (Ob ispytanii-yakh na korrozionnuyu ustalost' pri izgibe i pri kruchenii)

PERIODICAL: Zavodskaya Laboratoriya, 1959, Vol 25, Nr 4, pp 456-460 (USSR)

ABSTRACT: The tests were carried out in common with the metal laboratory of the "Elektrosila" Works. The problem of relationship between the fatigue limits in torsion and bending under the simultaneous effect of corrosion has not been much investigated up to date, and the results (Ref 3,4) are contradictory. For this reason, special investigations of steel 35 (0.35% C, 0.32% Si, 0.77% Mn, 0.027% S and 0.022% P) were carried out in this case. The samples were made of a long bar (diameter 25 mm); they were submitted to normalizing at 850-870° and had the following characteristics: σ_s = 33.1 kg/mm², σ_B = 62.1 kg/mm², δ_5 = 27.4% and ψ = 60.1%. The sketch of a sample is given (Fig 1). The transverse fatigue tests were carried out on machines of the type NU at a sample rotation speed of 3000 rpm. The torsion tests were made on an especially designed machine (... ...ring; ... V. K. Dobrev, Engineer) with a certain load

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Tests for Corrosion Fatigue in Bending and Torsion

moment (Fig 2). The working principle of the machine consists in the fact that by an eccentrically loaded, rotating vertical axis a torsional moment varying in magnitude and direction is produced on the sample. The frequency of the load cycles is determined by the speed of the electric motor driving the vertical axis, and amounted to 2500-2500 cycles/minute. The corrosion agent was a 5% NaCl solution, and parallel tests with air were made. V. V. Marugin (Tsentral'nyy nauchno-issledovatel'skiy institut [illegible] flota) (Central Scientific Research Institute of the Merchant Marine and Ye. A. Suvorova (zavod "Elektro- [illegible] works) took part in the experiments. The fatigue curves obtained show that the corrosion-fatigue resistance greatly depends on the number of load cycles. The test results obtained show, among other things, that the relationship between the corrosion-fatigue resistance in bending and torsion remains the same for corrosion-resistant materials. There are 4 figures and 8 references, 6 of which are Soviet.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut morskogo flota (Central Scientific Research Institute of the Merchant Marine)

20(5) SOV/[illegible]-28-7-50/[illegible]

AUTHORS: Dzvonkovy, N. N. Academician of the AS USSR, Vitman, F. F. Professor, Doctor of Physical and Mathematical Sciences, Glikman, L. A. Professor, Doctor of Technical Sciences, Fridman, Ya. B. Professor, Doctor of Technical Sciences, Mirolyubov, I. N. Candidate of Technical Sciences, Rabov, I. A. Junior Scientific Collaborator

TITLE: Yevgeniy Mikhaylovich Shevandin (Yevgeniy Mikhaylovich Shevandin)

PERIODICAL: Zavodskaya laboratoriya., 1962, Vol 28, Nr 7, p 896 (USSR)

ABSTRACT: This is an obituary written on the occasion of the death of the scientist mentioned in the title. Shevandin was one of the leading scientists in the field of material mechanics; he became famous for his investigations of the nature of destruction by brittleness and the phenomena of destruction by brittleness of metals at low temperatures carried out at the Fiziko-tekhnicheskiy institut (Physical and Technical Institute). After 1945 the deceased dealt with the problems of cold-shortness of ferrous metals which are of great importance in ship-building. Ye. M. Shevandin published two manuals on the mechanical properties of metals as well as

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SOV/32-25-7-50/50

Yevgeniy Mikhaylovich Shevandin

more than 50 original papers. His monograph "Tendency of Low-alloy Steels Towards Brittleness" was published in 1953.

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PHASE I BOOK EXPLOITATION 307/4591

Leningrad. Inzhenerno-ekonomicheskiy institut

Chistovaya obrabotka i sostoyaniye obrabotannoy poverkhnosti (Finishing Operations and Surface Roughness) [Leningrad] Izd-vo Leningr. univ-ta, 1960. 268 p. (Series: Its: Trudy, vyp. 30) 1,825 copies printed.

Ed. (Title page): A.A. Matalin, Professor; Ed. (Inside book): G.M. Aron; Tech. Ed.: S.D. Vodolagina.

PURPOSE: This collection of articles is intended for technical personnel in the machine-building industry and for students in schools of higher technical education.

COVERAGE: The collection contains articles on the problems of developing methods of mechanical machining (such as grinding and superfinishing with strain hardening, roll burnishing, fine grinding, etc.) which would serve to increase the life of machine parts exposed to friction and wear, and thereby insure high productivity and economy. Methods for determining residual stresses (only in macrostresses and microstresses) are discussed in detail. Also considered are the possibility

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of using hydraulically actuated slide rests in lot production, the use of the group machining method, and an attachment for program control of an existing lathe which would not necessitate modernization of the lathe. A description of advanced production methods and work planning used in plants of the German Democratic Republic is presented. No personalities are mentioned. References accompany most of the articles.

TABLE OF CONTENTS:

Card 3/4

AVAILABLE: Library of Congress

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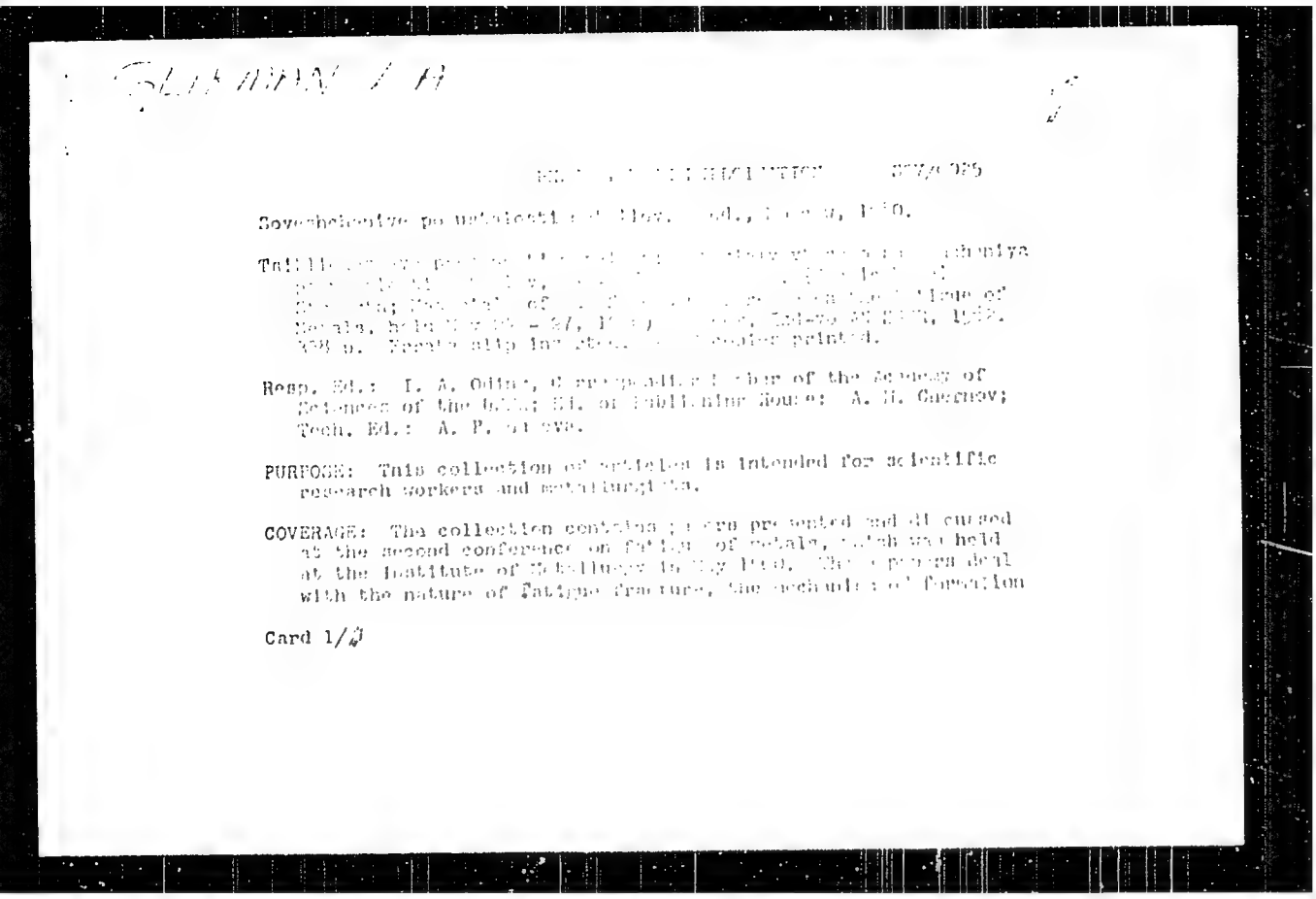
11-16-60



SUBJECT CLASSIFICATION 3/4/029

Sovshchaniye po metallovedeniyu. Sbornik, Moscow, 1950.

Title [illegible] Conference on the Nature of Metals, held [illegible], Institute of Metallurgy, 1950. 338 p. Errata slip inserted. 2,000 copies printed.

Resp. Ed.: I. A. Odling, Corresponding Member of the Academy of Sciences of the USSR; Ed. of Publishing House: A. N. Gusenov; Tech. Ed.: A. P. [illegible].

PURPOSE: This collection of articles is intended for scientific research workers and metallurgists.

COVERAGE: The collection contains papers presented and discussed at the second conference on [illegible] of metals, which was held at the Institute of Metallurgy in May 1950. The papers deal with the nature of fatigue fracture, the mechanism of formation

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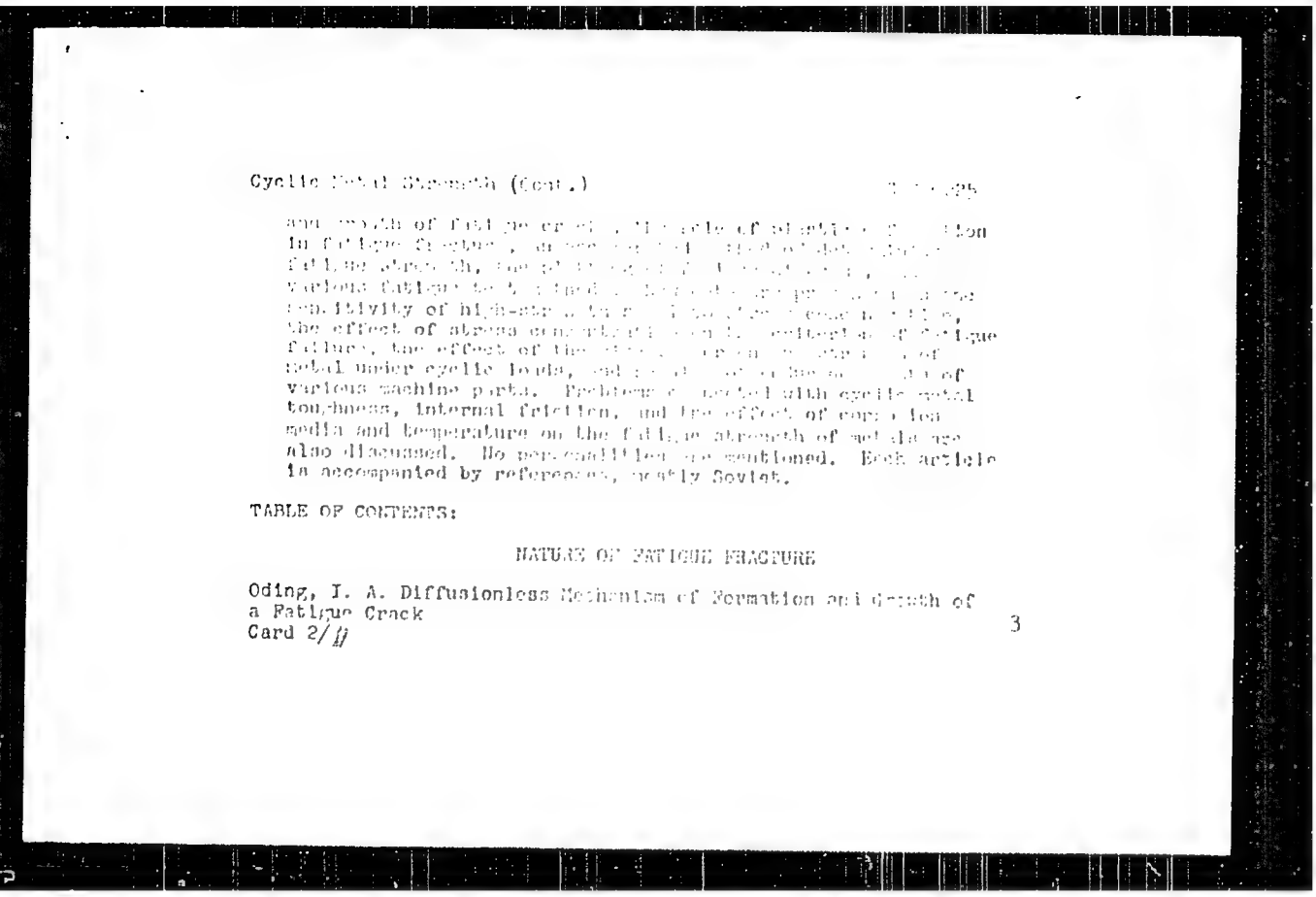


Cyclic Metal Strength (Cont.) [illegible]

[illegible] of fatigue cracks, the role of oxidation in fatigue fracture, [illegible] fatigue strength, [illegible] various factors [illegible] sensitivity of high-strength steels, the effect of stress concentrators, resistance of fatigue failure, the effect of the [illegible] of metal under cyclic loads, [illegible] of various machine parts. Problems connected with cyclic metal toughness, internal friction, and the effect of corrosive media and temperature on the fatigue strength of metals are also discussed. No personalities are mentioned. Each article is accompanied by references, mostly Soviet.

TABLE OF CONTENTS:

NATURE OF FATIGUE FRACTURE

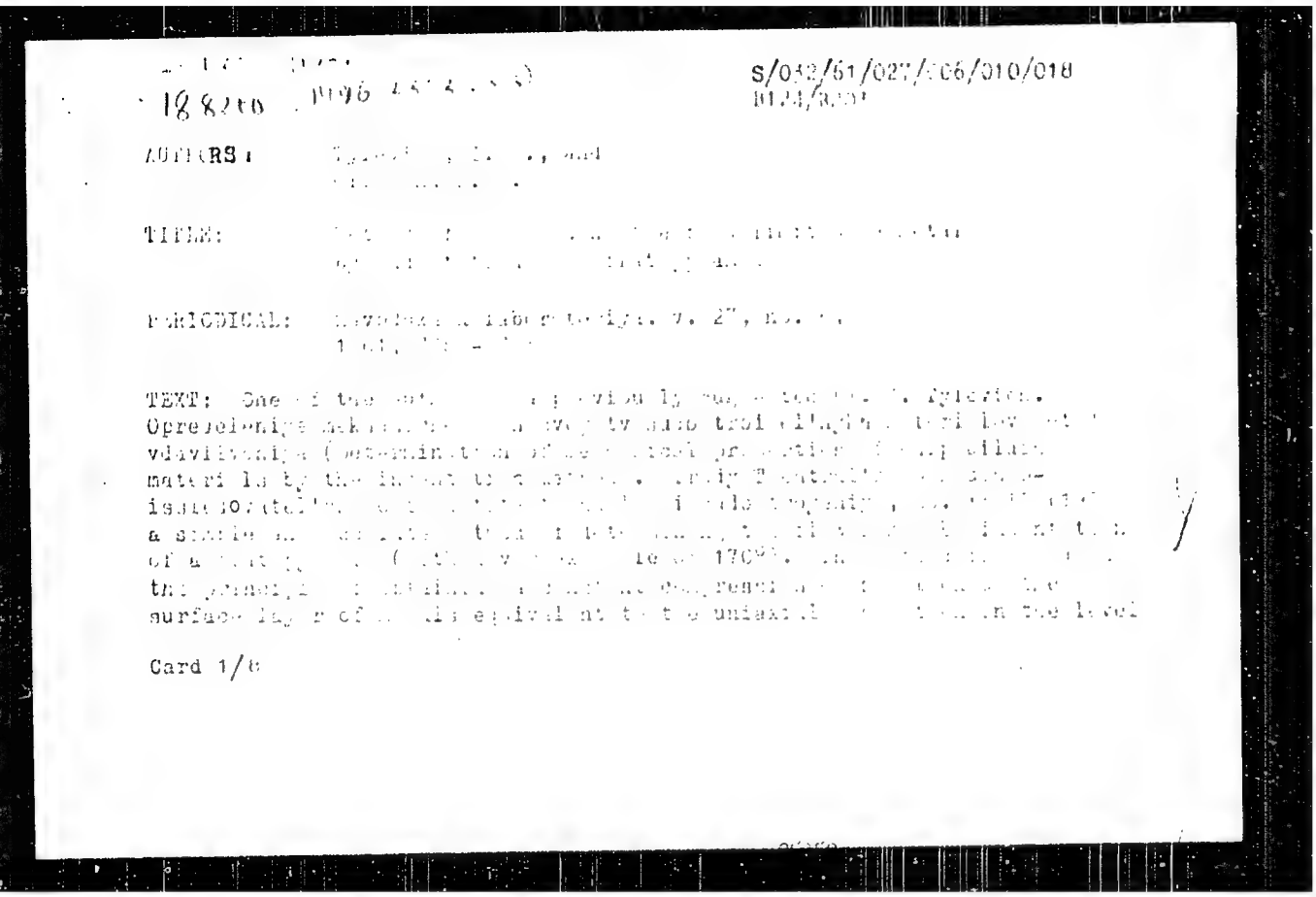
Oding, I. A. Diffusionless Mechanism of Formation and Growth of a Fatigue Crack 3

Card 2/[illegible]

GLIKMAN, L.A.; TEODOROVICH, V.P.; KOLGATIN, N.N.; DERYABINA, V.I.

Long-duration strength of some steels in the testing of tubular specimens under internal pressure of hydrogen at high temperatures. Khim.sera-i azotorg.soed.sod.v neft.i nefteprod. 3:439-450 '60. (MIRA 14:5)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut neftekhimicheskikh protsessov.
(Steel--Testing) (Hydrogen)



S/058/61/027/006/010/018
B124/B201

AUTHORS:

TITLE:

PERIODICAL:

TEXT:

Card 1/6

of the flow limit. [illegible] the equivalence [illegible] that the build-up at compression leads to the contraction [illegible] tion, which results [illegible] in plastic deformation. The flow limit $\sigma_{0.2}$ at elongation is, at constant deformation tolerance, $\delta = \Psi = 0.2\%$. Constant deformation is attained with the use of a point with constant indentation angle. When indenting a conical point in the metal, its surface layer of the thickness t_0, limited by a circle of the radius r, is deformed, which results in a transformation of the disk to a conical funnel with the radius l and the thickness t_1. The equation

$q = 1 - r/l = 1 - \sin(\alpha/2)$, gives, for $q = 0.2\%$, a vertex angle $\alpha = 17.7^0$. As a cone with such a vertex angle gives indistinct, poorly measurable indentations, an equivalent four-sided pyramid with a vertex angle of 170^0 was chosen, which, in the following, will be called α-pyramid. It was experimentally found that for this pyramid the ratio σ_T/H_m (σ_T being the flow limit at elongation, and H_m the mean contact pressure of the truncated cone) is very near 0.33. When determining the flow limit by indentation of the α-pyramid, a load of P = 3000 kg is used, and the mean

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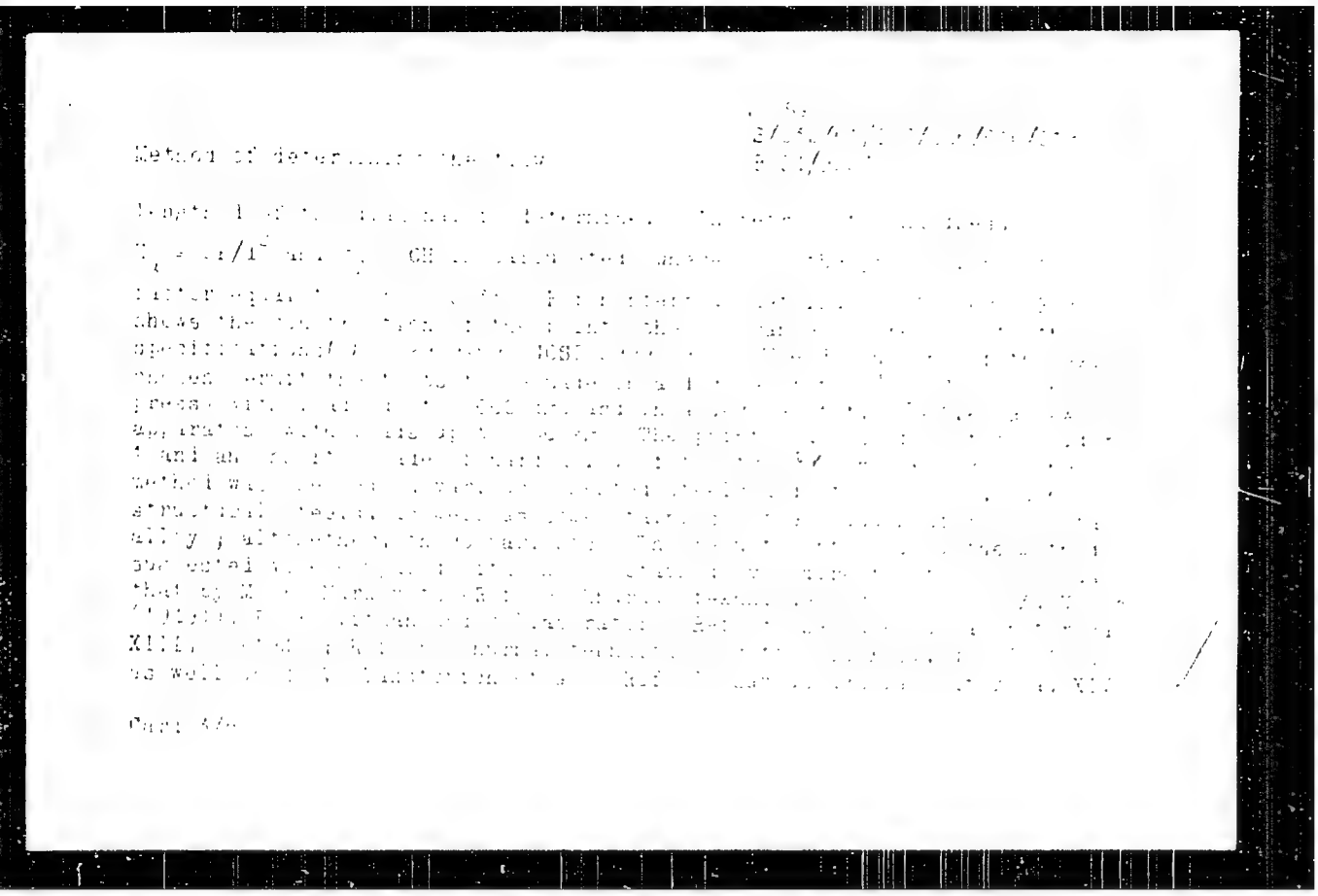

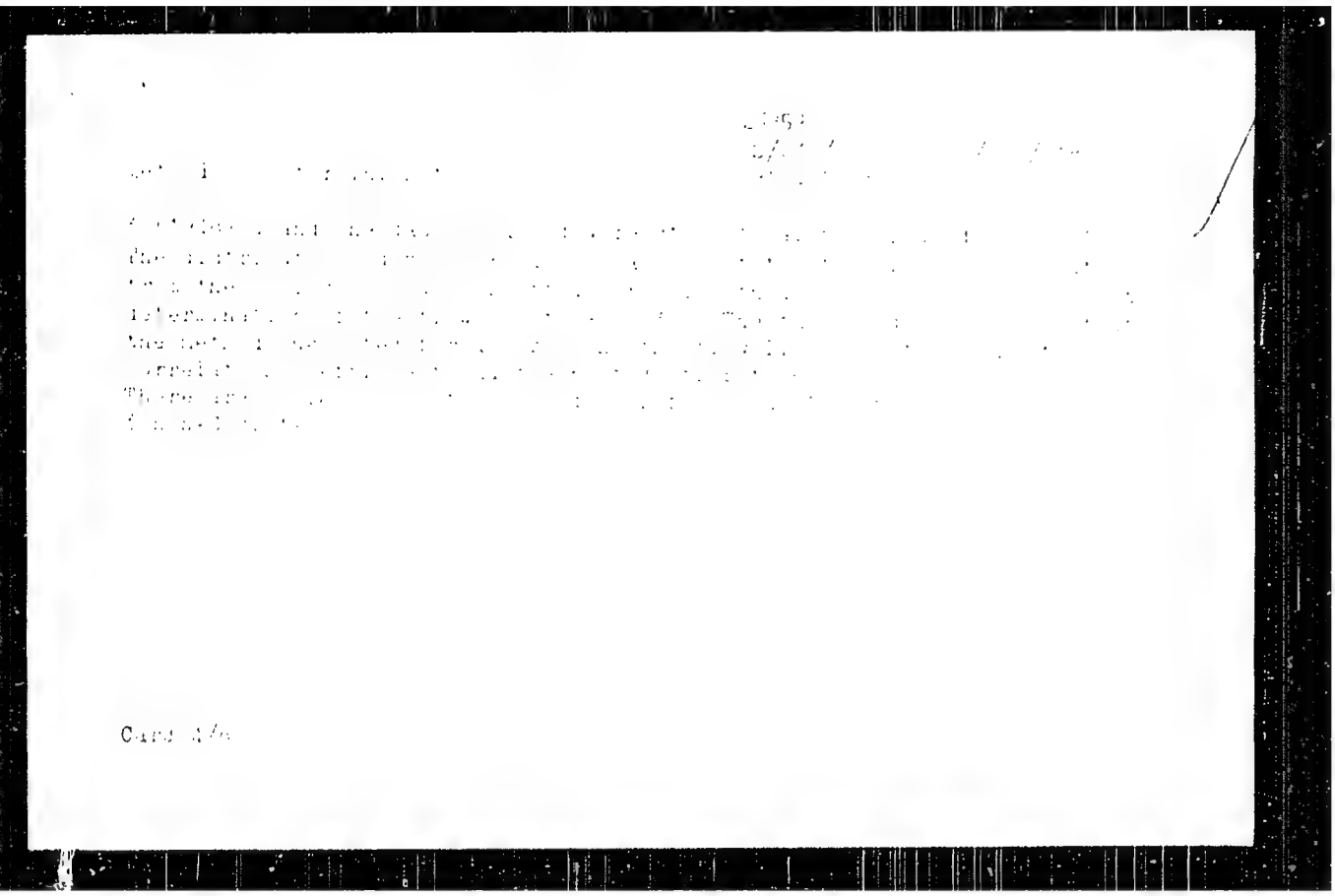

183200

AUTHORS [illegible]

TITLE [illegible]

PERIODICAL [illegible]

TEXT: The influence of hydrogen was investigated [illegible] for Armco iron with composition (in %) [illegible] 0.03, [illegible] 0.09, Mn 0.25; [illegible] at 400 and 450° [illegible] 0.23, Si 0.34, Mn 0.47, [illegible] 0.1, Ni 0.[illegible] and [illegible] steels [illegible] - 0.17, Si 0.22, Mn 0.54, [illegible] 0.2, W 0.3%, Mo 0.46; [illegible] - 0.12, Si 0.74, Mn [illegible] 2%, Si 0.3, [illegible] and 45[illegible] - 0.45, Si 0.23, Mn [illegible] besides, [illegible] steels with additional [illegible] of V, W, Mo and Ni [illegible] was [illegible]. Almost [illegible] saturated specimens of Armco iron and Cr20 type [illegible] flow particle is [illegible] tension

and /2

26051

Mechanical properties ...

Subsequent normalizing restores the flow surface $\sigma_{0.2}$ to ... 20 is reached by half as result of the hydrogen action, and duct... almost completely a ... As result of the heat after treatment, $\sigma_{0.2}$, δ, ψ are increased but their values remain below the original values. After the ... duration ... is greatly lowered. The cracking of hydrogen ... and ... with manifestation of a ... thickness after ... great ... that without noticeable traces of plastic deformation, steel 45 ... practically subject to hydrogen cracking. $\sigma_{0.2}$ decreases from 58.0 to 45 kg/mm^2, σ_v - from 77.0 to 58.0 kg/mm^2, δ - from 39.2 to 7.2 %, ψ - from 62.0 to 9.0%, and a_k - from 12.9 to 2.2 kg-m/cm^2. The strength properties of ... steel, Kh 2MF ... (Kh.6VF) decrease slightly ... the plastic properties decrease ... times.

... Smirnova

[Author's note: Complete ... is ...]

Card 2/2

GLIKMAN, L.A., doktor tekhn.nauk; TEKHT, V.P., kand.[illegible]

Effect of intermediate heatings during the fatigue process in steel on its durability. Trudy LMI no.[illegible] 1958.
(MIRA [illegible])

(Steel--Fatigue) (Annealing of metals)

GLIKMAN, L.A., doktor tekhn.nauk; BABAYEV, A.N., kand.tekhn.nauk; KOSTROV, Ye.N., kand.tekhn.nauk; DAMASKINA, O.L., inzh.

Fatigue strength and residual stresses in steel specimens surfaced with 1Kh13 high-chromium stainless steel. Trudy LMZ no.9:138-151 '62. (MIRA 16:6)
(Steel--Fatigue) (Thermal stresses)

GLIKMAN, L.A., doktor tekhn.nauk; TEKHT, V.A., kand.tekhn.nauk
NAZAROVA, Ye.I., inzh.

Removal of residual stresses in titanium alloys and aluminum alloys of aluminum by means of tempering. Trudy LMI no.[illegible] [illegible]

(Titanium alloys--Heat treatment)

GLIKMAN, L.A., doktor tekhn.nauk; [illegible], inzh.

Effect of hydrogen absorption [illegible] on the brittle strength of rapid steel. [illegible]

(Steel--Hydrogen content) [illegible]

S/137/62/000/011/034/045
A006/A101

AUTHORS: Glikman, L. A., Kostrov, Ye. N.

TITLE: The effect of the scale factor upon the corrosion-fatigue strength of metals

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 11, 1962, 113 - 114, abstract 11I741 (In collection: "Tsiklich. prochnost' metallov", Moscow, AN SSSR, 1962, 187-196)

TEXT: The authors studied the effect of the scale factor upon the corrosion-fatigue resistance in sea water of the following materials: structural carbon steel ST 40 (St 40) in annealed state, structural Cr-Ni-steel 40 KhN (40KhN), stainless austenitic steel 1 Kh18N9T (1Kh18N9T) in rolled state, brass LMtsZh 55-3-1 (LMtsZh55-3-1) and LAMtsZh 67-5-2-2 (LAMtsZh67-5-2-2) in cast state. Results are presented on variations of the corrosion-fatigue strength of all materials under atmospheric conditions, in 3% NaCl (imitating sea water) and fresh water, depending upon the frequency of cycles, the shape and dimension of specimens. The process of corrosion-fatigue failure is determined by the interaction

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The effect of the scale factor upon the... S/137/62/000/011/034/045
A060/A101

of 2 factors: namely, the corrosion and the mechanical factor. From the relative share of these factors, under otherwise equal conditions (material, frequency of cycles, shape and dimension of specimens, corrosion medium), depends upon the basis of the cyclic effect. There are 16 references.

N. Lukashina

[Abstracter's note: Complete translation]

Card 2/2

GLIKMAN, L.A.; BABAYEV, A.N.

Stability of residual stresses occurring during shot peening in conditions of cyclic loading. Trudy LKI no.38:43-54 '62.
(MLA 16:7)

1. Kafedra svarki sudovykh konstruktsiy Leningradskogo korablestroitel'nogo instituta.

(Shot peening) (Strains and stresses)

S/277/63/000/001/003/017
A052/A126

AUTHORS: Glikman, L. A., Kostrov, Ye. N.

TITLE: Effect of size factor on corrosion-fatigue strength of metals

PERIODICAL: Referativnyy zhurnal, otdel'nyy vypusk, 48. Mashinostroitel'nyye materialy, konstruktsii i raschet detaley mashin, no. 1, 1963, 4, abstract 1.48.20 (In collection: "Tsiklich. prochnost' metallov", M., AN SSSR, 1962, 187 - 198)

TEXT: The effect of the size factor on corrosion-fatigue strength of carbon steel, 40 XH (40KhN) Cr-Ni structural steel, 1 X 18 H 9 T (1Kh18N9T) stainless austenitic steel, ЛМЦЖ55-3-1 (LMtsZh55-3-1) and ЛАМЦЖ 67-5-2-2 (LAMtsZh67-5-2-2) brass was studied in 3% NaCl solution simulating sea water on an НЦ (NTs) machine at rotational bending. It is pointed out that under atmospheric conditions all materials studied showed the usual effect of the size factor reflecting in the reduction of fatigue strength with the increase of the diameter of samples from 9 - 10 to 60 - 70 mm. For structural steels 40 and 40Kh with the increase of the diameter of samples from 9 to 55 - 60 mm at a low-

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Effect of size factor on...

base cyclic stress in 3% NaCl solution the usual effect of the size factor is also observed. Beginning with a certain base of cyclic stress and at its further increase a positive effect of the size factor is observed, viz. the corrosion-fatigue strength of large samples is higher than that of small ones. With the increase of the diameter of samples from 10 to 60 mm the effect of the size factor on fatigue strength of 1Kh18N9T stainless steel at a simultaneous corrosion in 3% NaCl solution proved to be qualitatively the same as under atmospheric conditions. With the increase of the cyclic stress base the negative effect of the size factor on corrosion-fatigue strength of this steel intensifies due to the crevice corrosion effect mainly in large samples. Fatigue tests in 3% NaCl solution of cast brass grades LMtsZh and LAMtsZh show that the effect of the size factor under these conditions is considerably lower than in the air. The results obtained in this study confirm the supported conceptions that the process of corrosion-fatigue breakdown is determined by the interaction of corrosion and mechanical factors. Thereby the relative part played by these factors, other conditions being equal (material, cycle frequency, shape and dimensions of samples, corrosion medium) depend on the cyclic stress base. There are 16 references.
[Abstracter's note: Complete translation]

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